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The OIL AND GAS JOURNAL

DECEMBER 3
1942

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The Oil and Gas Journal

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This modern method of pumping makes possible many new ways of lifting oil, greatly simplifying old problems. Large numbers of wells now can be pumped from one central plant with high efficiency and exact individual control. Power problems are simplified through centralized concentration, while large savings in steel and field operating time are made possible. Steel stocks for maintenance purposes are eliminated, and operating equipment kept to a minimum at all times.

The rapidly spreading appreciation of the many advantages of this new method of pumping led to its greatly increased use in 1942, and many more wells will be Kobe equipped in 1943.

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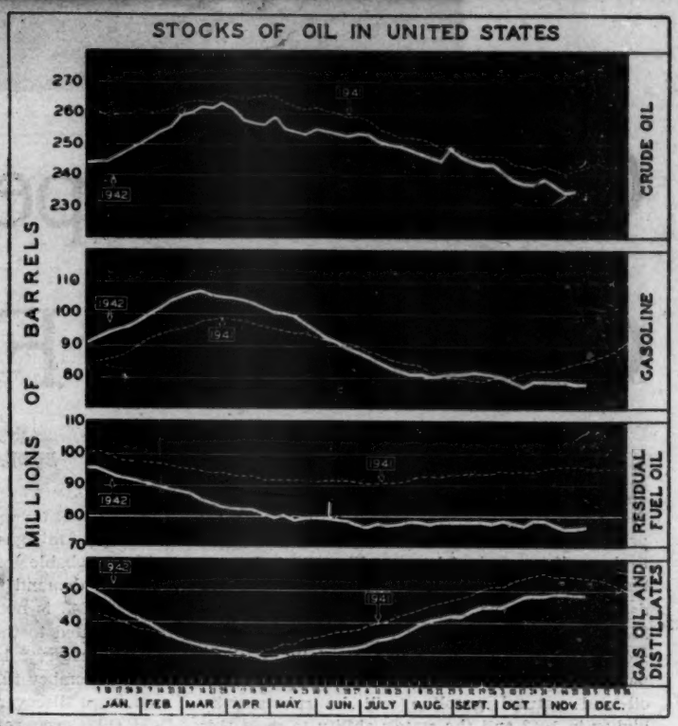
Trends

Strong Demand In Prospect Despite Gasoline Rationing



NATIONAL gasoline rationing which became effective Tuesday will reduce the civilian demand for gasoline in this country in December compared to December 1941, 35 to 40 per cent, according to estimates of petroleum economists. About the only way to gage the national effects of the severe curtailment in civilian gasoline use is to analyze those areas in which rationing has been effective. State gasoline-tax reports for August show that in the 17 eastern and southeastern states and the District of Columbia where rationing restrictions were in effect, the civilian requirements decreased 35 per cent. The state decreases compared to August 1941, ranged up to 53 per cent in New Hampshire. Many believe that under national rationing the decrease from the normal prewar period for comparable months will be 40 per cent.

Assuming a 35 per cent reduction in civilian use for December the decline in gasoline demand this month compared to December 1941, will average about 560,000 bbl. daily. There are, of course, many offsetting factors to this large decline in nonmilitary consumption. There is no definite information regarding these offsets due to war restrictions. The production of aviation gasolines which is increasing weekly will total around 250,000 bbl. daily early in 1943 and additional increases are assured before the end of next year. Then there is the gasoline going to camps in this country and foreign countries. Lend-lease shipments of gasoline to Allied nations are greater. There are those who believe that when these other uses are taken into consideration the decline in over-all demand for gasoline at refineries in this country will not exceed 20 per cent.

In regard to the total demand for all oils there are additional offsets to the loss in gasoline. The military demands for practically all grades of residual fuel oils and distillates are increasing. It is due to this need for products other than gasoline that a majority of refineries have been able to maintain peak operations. There is no prospect of an immediate change in this situation so long as the military and civilian demands for these other products continue to expand. In this connection OPC has recommended a daily production of petroleum liquids in this country of 4,015,900 bbl. this month, a decrease of only 7 per cent compared to the actual production of petroleum liquids in December 1941. It is pointed out, as shown on the crude-stock chart on this page, that OPC recommendations as to needed crude-oil production have been substantially less than the monthly consumption.

CRUDE PRODUCTION *3,887,225 bbl. daily average — down 28,600 bbl. One year ago 4,085,570 bbl.*

CRUDE STOCKS *235,305,000 bbl. as of Nov. 21—up 43,000 bbl. One year ago 241,956,000 bbl.*

GASOLINE STOCKS *78,854,000 bbl. as of Nov. 28—up 271,000 bbl. One year ago 86,889,000 bbl.*

RESIDUAL FUEL-OIL STOCKS *77,796,000 bbl. as of Nov. 28—up 17,000 bbl. One year ago 94,817,000 bbl.*

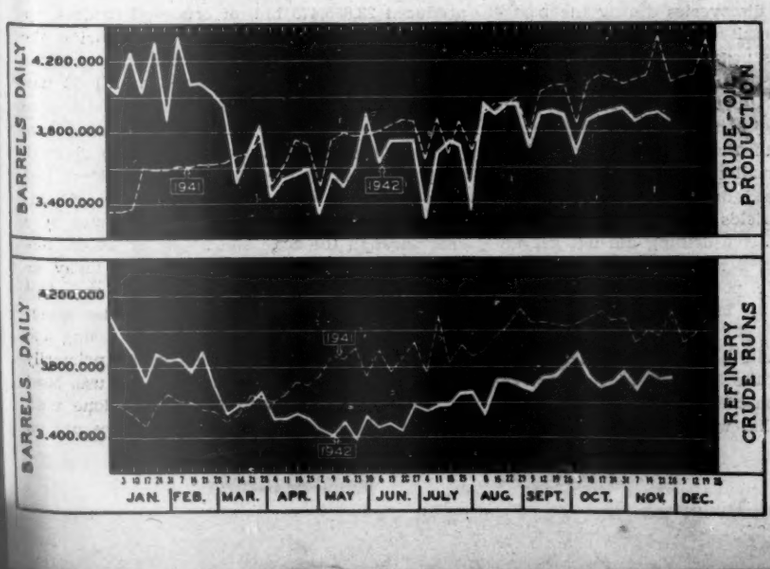
GAS OIL AND DISTILLATES *49,739,000 bbl. as of Nov. 28—up 198,000 bbl. One year ago 55,251,000 bbl.*

REFINERY RUNS *3,736,000 bbl. daily week ended Nov. 28—up 14,000 bbl. One year ago 4,145,000 bbl.*

DAILY AVERAGE PRODUCTION FOR WEEK

	Nov. 28 crude oil	Nov. OPC quota all oils	Nov. 21 crude oil
Arkansas	73,600	77,200	74,000
California	735,250	782,000	739,750
Colorado	6,640	7,000	6,565
Eastern fields	94,000	105,200	92,700
Illinois	254,000	280,900	263,500
Indiana	17,000	18,400	15,550
Kansas	299,100	300,700	311,550
Louisiana	325,400	333,800	325,400
North Louisiana	*96,600*	.....	*96,700*
Louisiana Gulf Coast	*228,800*	.....	*226,700*
Michigan	58,400	64,500	61,880
Mississippi	61,000	50,000	64,500
Montana	21,665	24,800	22,420
Nebraska	3,100	3,400	3,150
New Mexico	101,460	100,600	101,460
Oklahoma	365,500	407,500	363,300
Texas	1,376,700	1,381,000	1,376,450
East Texas	*354,800*	.....	*354,800*
West Texas	*212,600*	.....	*212,500*
North Central Texas	*137,600*	.....	*137,600*
East Central Texas	*95,500*	.....	*95,600*
Texas Panhandle	*89,800*	.....	*89,800*
Texas Gulf Coast	*416,000*	.....	*415,800*
Southwest Texas	*70,400*	.....	*70,350*
Wyoming	94,100	94,400	93,650
Total United States	3,887,225	4,031,400	3,915,825

Total production, January 1-November 28, 1942 ..... 1,264,458,575 bbl.
Same period last year ..... 1,264,329,730 bbl.
Texas shutdown days, November 22, 28; previous week, 15, 21.



California Operators Turn to Old Shallow Fields for New Oil

By L. P. STOCKMAN

LOS ANGELES, Calif.—The most important factor confronting the California oil industry at the present time is whether operators can meet probable future demands for crude oil and natural gasoline required by war. The state's December allowable has been set at 815,000 bbl. per day, which means that operators must produce about 45,000 bbl. of natural gasoline and distillate and 770,000 bbl. of crude oil daily. Preliminary estimates indicate that demand for crude oil and natural gasoline will be substantially higher in 1943 and the state's ability to meet this increased demand depends upon current and near-future development.

If OPC continues consistently to increase the production obligations of California from month to month, as demand increases, the resistance point may be reached sooner than expected and when that top has been reached the coordinator will be faced with two alternatives. He can either abolish the maximum efficient rate or face the realization that it will require additional drilling to maintain crude-oil production at desired levels. Long before the maximum efficient rate of production was recognized as the optimum engineering factor, operators realized that it required constant drilling to maintain relatively stable production. The production problem is complicated by the fact that the California Department of Natural Resources has been adamant in its refusal to permit gas waste.

The probable inability of California to meet expected demand for crude oil and refined products in 1943 is not generally recognized and can be attributed to the fact that not a single discovery of primary importance has been recorded since November 1938, when Coles Levee and Tupman were discovered by Ohio Oil Co. and Richfield Oil Corp., respectively. The discovery rate has been satisfactory but the productivity of new fields found during the past 4 years has been negligible.

Deep Discoveries Few

A few deep-zone discoveries have been made during this 4-year period and while the finding of the Stevens zone of Miocene age productive in the Elk Hills field is of primary importance this pay will not contribute to commercial production. It will be held back by the Navy Department in order to assure an adequate future supply of fuel oil for the U. S. Fleet. This major anticline is in Kern County within Naval Reserve 1, and consequently all fee-owned acreage within this reserve will eventually be condemned for the Navy and production activities discontinued indefinitely.

Estimates of probable future demand in 1943 have been closely guarded. While recognizing the need for caution in handling these estimates, operators are keenly interested in ascertaining what will be needed next year. It might be beneficial, therefore, if OPC would set up some concrete objective toward which the California oil industry could strive.

There is undoubtedly a considerable quantity of drilling and production material scattered throughout the country that could be made available for use in California in the present emergency. In addition to providing the required material, it will be necessary to secure numerous drilling crews to replace those attracted into defense industries during the past several months of low activity.

The absence of new, undeveloped fields, reflecting the paucity of discoveries during the past 4 years, and the necessity of increasing state production as much as possible, have prompted operators to engage in widespread development work in many of the older fields where such additional drilling is justified. Operators have selected those fields that will yield the largest production with the smallest amount of critical material. This increased drilling and rejuvenation work in the older fields is a comparatively new development. Aggressive drilling did not get under way until about 2 months ago. The current program was made possible by exceptions to M-68 as well as by the large fee holdings of various operators.

Among other results has been the extension of the outer limits of the South Belridge field. Inside the older section of the field Belridge Oil Co. started out with what was to result later in an aggressive development program involving over 50 new shallow wells. Most of the drilling now being done in San Joaquin Valley is in shallow fields where rapid digging is possible and where few mechanical problems exist. At South Belridge, a number of wells have been completed in the 800-ft. zone in less than a week. Locations and preliminary preparations are made ahead of the portable drilling equipment so very little time is lost between wells. Several types of portable rigs are being used as operators are not so much interested in how efficient the equipment is as they are in portability and continued operation. There is a definite market for many more portable units.

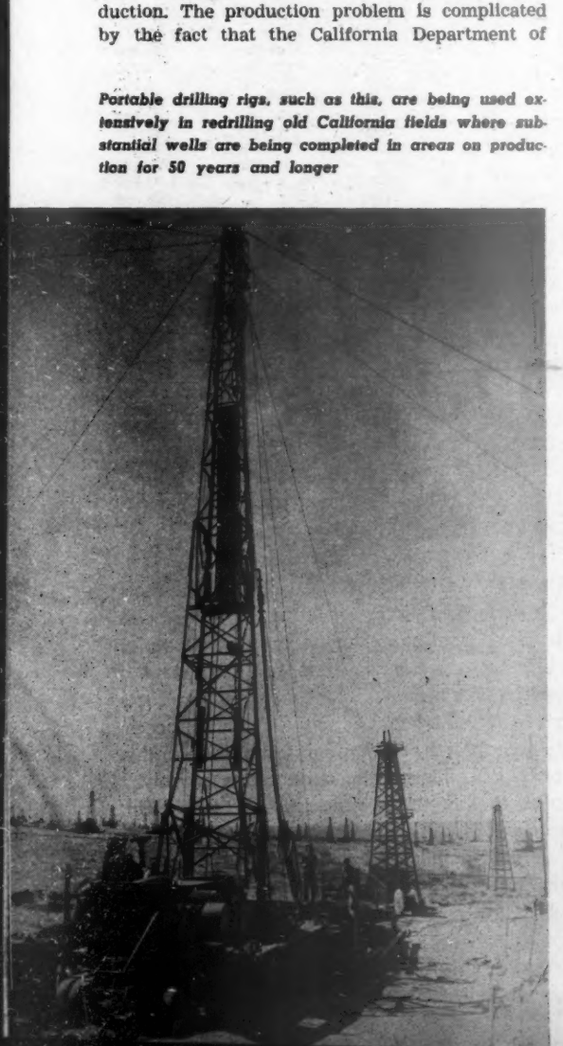
In the Kern Front field, which was discovered by George F. Getty, Inc., in 1925, operators have completed 15 new wells during 1942 to date and have added 1,209 bbl. of new daily production. There are six drilling wells in the field and locations have been made for 26 more to be drilled as soon as equipment becomes available. In the old Kern River field, which was discovered by Elwood and Means in 1899, there is one new well under way and locations made for four more. Production is developed on the Kern River Front at approximately 2,000-3,000 ft. and in the old Kern River field from 250 to 1,200 ft. The casing program at Kern Front contemplates the landing of an 8⅝-in. water string over the sand followed by a perforated liner and 2½-in. tubing.

Drilling Costs Lower

Kern River and Kern Front have produced a total of 333,823,493 bbl. of crude oil since discovery. This production to date indicates that both sections of Kern River have proved prolific. The old Kern River field proved to be one of the most profitable in the state, and considering the comparatively shallow depths at which production is secured the recovery record is outstanding. Drilling costs during the early development of the field exceeded $25,000 per well in some cases and averaged $15,000 in others. Today wells are being drilled to comparable depths in about a week and at substantially lower costs.

In the South Belridge field, which was discovered in 1911 by Belridge Oil Co. and which has produced 23,855,475 bbl. of crude oil to date, operators have finished 63 new wells during the first 11 months of 1942 and in doing so added 3,641 bbl. of new daily production. All 63 new wells were completed in the upper Belridge zone of Pleistocene age, or Pleistocene-Pliocene contact, at depths ranging from 600 ft. to approximately 1,000 ft. The casing program at South Belridge contemplates the landing of 6⅝-in., 8⅝-in., or 9-in. casing on top of the zone followed by a liner through the zone and 2½-in. or 2⅞-in. tubing. Much of the equipment being used today depends upon what is available for use and does not represent what operators might use under other circumstances. The diameter of casing and tubing in this and other fields depends primarily upon what is available and suitable for use. Most current drilling at South Belridge is done with portable rigs and many of the wells are put on

Portable drilling rigs, such as this, are being used extensively in redrilling old California fields where substantial wells are being completed in areas on production for 50 years and longer



jack lines when completed. All production is by artificial lift and at present there are nine strings of tools in operation and 16 locations made.

In the East Coalinga field of Fresno County, operators have completed 13 new wells during the year to date and added 2,139 bbl. daily of new production. This field, which was discovered around 1887, and which has produced 243,522,249 bbl. of crude oil to date, is sustaining four strings of tools with an additional 17 locations made for future work. West Coalinga, opened in 1901, has produced 130,692,684 bbl. of crude oil to date. There are three new wells under way and eight additional locations awaiting drilling. West Coalinga has contributed seven new wells and 280 bbl. of new daily production during 1942 to date.

Midway-Sunset Activity

The Midway-Sunset field of Kern County, which in reality consists of several productive structures and areas, is sustaining 17 strings of tools and locations have been made or mapped for 26 additional wells. Production of this field since discovery aggregates 929,846,315 bbl. and current production averages 57,250 bbl. per day.

Mount Poso and Round Mountain are also showing increased drilling and Antelope Plains, a comparatively recent discovery by Shell Oil Co., Inc., will have several additional wells drilled in the immediate future. Mount Poso, discovered by Shell in 1923, has four new wells under way and four additional locations made. Round Mountain, discovered in 1927 by Elbe Oil Land Development Co., has five wells under way and six additional locations. Antelope Plains has one well and five additional locations.

Much of the drilling now being done in the older fields of the state and particularly in the San Joaquin Valley would ordinarily not have been undertaken for several years. But with the possibility of a staggering rise in demand, operators are bending every effort to develop as much additional production as possible. The present scope of drilling would be greatly increased if prices for heavy crude oil were stepped up as at present only the large companies are able to stand the cost of additional development. In the meantime, old wells are allowed to become obsolete because of low prices and if this continues for any great length of time they will not be salvable. This is surprising in view of the large demand anticipated and operators are at a loss to understand the view of OPA in refusing to grant an increase in price.

●

Royalty Lowered on Federal Leases by O'Mahoney Bill

WASHINGTON, D. C.—House action was awaited this week to complete legislation on an act designed by Senator O'Mahoney of Wyoming to stimulate exploratory operations on federal land. The Senate passed the bill a week ago and Senator O'Mahoney is hopeful of receiving House affirmation before the current term of Congress ends.

Under the measure a flat royalty of 12½ per cent would be paid the Government by producers for new oil reserves anywhere on the public domain for a period of 10 years. Under existing law the royalty payments range from 12½ to 32 per cent and must be paid under 20-year leases.

An amendment to the original act provides for royalty not to exceed 7½ per cent for 40 acres in cases where discoveries are made on small tracts and applies only to new reserves. This amendment was offered by Senator O'Mahoney and adopted by the Senate as a special inducement in view of the standard lease size of 640 acres.

The snakelike joints are not prehistoric monsters but sections of pipe dragged by boom tractors of Sheehan Pipe Line Construction Co. in completing 152 miles of 8-in. loops along Illinois Pipe Line Co.'s system between Lima and Sparta, Ohio, to increase facilities for moving crude to the East Coast, part of OPC Project 1

This Week...

RATIONING.—Nation-wide restrictions became effective December 1. Letter from White House temporarily subdued opponents. Renewed fight brewing, hitting at Leon Henderson's OPA through congressional withholding of appropriations. . . . Administration softens outlook by promising sensible application of rationing, to avoid interference with essential production. . . . Local motor-fuel boards have final say on supplementary applications under present set up; powers may be circumscribed with more specific regulations from OPA, if administration is too liberal. . . . Majority of western drivers cling to belief that regulation is only temporary, that it will bog down production, hopelessly snarl transportation, terminate in modification. . . .

TRANSPORTATION.—Another line, the 20-in. from Texas Gulf to East Coast, only solution to overland transportation goal, now set at 1,400,000 bbl. daily. . . . Present distribution of tank cars to be unmolested, pending results of other efforts to speed up turnaround, unloading, repair delays. . . . Eastern deliveries through existing and expanded lines to rise 27,000 bbl. daily in near future, when links in OPC Project 1 are completed. . . . Sinclair Refining Co. planning 585-mile line from Wood River, Ill., to Steubenville, Ohio. . . .

MARKETS.—Refinery prices steady at start of rationing. . . . Demand for regular motor fuel in December appears fixed at level unaffected by rationing; shipping instructions and orders on refiners' books for this month assure normal operations. . . . Fuel-oil rations for 30 eastern states to be unchanged for 5 weeks, removes speculation from demand outlook. . . . District 1 gasoline prices stiffen; authorities concentrate on reducing motor-fuel shipments, increasing fuel-oil deliveries. . . .

REFINING.—U. S. aid to Russia, in form of fabricated processing equipment, will total $15 to $20 million. . . . Defense Plant Corp. approves $3 million contract with Sun Oil Co., for butadiene plant at Toledo, Ohio. . . . Farm Bureau Cooperative Association of Columbus purchases refinery near Meraux, La., probably for rebuilding in Ohio. . . . Eastern plants making nonwar products facing closure, to concentrate transportation facilities on movement of finished fuels, at expense of crude. . . .

RUBBER.—Confidence that petroleum industry's share of butadiene program will come into production on schedule expressed by Rubber Director Jeffers. . . . Tire quotas raised for December, including those made almost entirely from reclaim, to give all motorists essential rubber. . . .

ADMINISTRATION.—Rumored shift of Coordinator Ickes to Department of Labor, arouses oil men who flood White House with protests. Operators fear selection of successor will be less satisfactory, possibly a man unsympathetic with industry's important war assignments or, worse still, one entirely without experience and knowledge of the business. . . .

PRODUCTION.—Concern growing over lag of reserves, behind current rate of withdrawals. Producers repeat warnings of imminent shortages, say only two correctives available: (1) Higher crude prices, and (2) more equipment. A third factor, manpower, would be corrected, producers feel, by adoption of the two cardinal reliefs. . . . Oil showing in northwestern Missouri watched; but acclaim as important discovery is withheld, pending more conclusive evidence. . . . California operators concentrate portable drilling rigs in old fields, for redevelopment program. . . .

Contracts Are Let for Eastern Extension of 24-in. Crude Line

By PAUL REED

WAR EMERGENCY PIPELINES, Inc., is making rapid progress in preparations for constructing the 875-mile extension of the 24-in. crude-oil line from Norris City, Ill., to the New York-Philadelphia terminals.

Some contractors have been moving crews from sections they have finished on the 531-mile Longview, Tex.-Norris City, Ill., to the extension. At the end of last week more than 476 miles of the southern leg had been welded in spite of almost continuous rains in northern Arkansas, Missouri and Illinois.

More than 700 carloads of pipe have been shipped to points along the route of the extension in Ohio and Pennsylvania. In surveying for the line, 17 parties in the field completed about 215 miles at the middle of last week. This week more than 30 right-of-way buyers are making purchases in the field.

War Emergency Pipelines, Inc., has established branch offices at Lancaster, Pa., and Washington Courthouse, Ohio. During the next 2 weeks, two or three additional branch offices will be established along the route. Before the end of December, all of the contractors are expected to be doing some work in each of the sections of the eastern extension.

Satisfactory progress is reported in the construction of pump stations. Pumps and motors are arriving. There have been delays in the delivery of 24-in. gate valves. Difficulty in getting gate valves threatens to be a serious bottleneck. For starting pumping operations, 50 of these large valves will be required. Last week it was reported that only one had arrived. Construction of railroad tracks at Norris City has gone ahead in spite of much rainy weather. Building of tanks at Longview, Tex., has been under way for more than a week.

Work Split in 17 Sections

Contracts for the construction of the extension from Norris City eastward have been awarded to the following firms:

Section 9.—From Norris City, Ill., to Oakland City, Ind., 64 miles—Sheehan Pipe Line Construction Co., Tulsa.

Section 10.—Oakland City to Paoli, Ind., 54.5 miles—Ray L. Smith Construction Co., El Dorado, Kans.

Section 11.—Paoli to Vernon, Ind., 59.4 miles—Anderson Brothers, Little Rock, Ark.

Section 12.—Vernon, Ind., to Middleton, Ohio, length approximately 65 miles—Anderson Brothers, Little Rock, Ark.

Section 13.—Middleton to Washington Courthouse, Ohio, 65 miles—C. S. Foreman Co., Kansas City, Mo.

Section 14.—Washington Courthouse to Crooksville, Ohio., 60.5 miles—W. A. Bechtel Co., San Francisco, Calif.

Section 15.—Crooksville to Miltonsburg, Ohio, 50.4 miles—W. A. Bechtel Co., San Francisco, Calif.

Laying pipe for river crossing of War Emergency Pipelines, Inc., by Williams Brothers Corp., contractor. In the background joints are being hot-bent preparatory to adding to the line

Section 16.—Miltonsburg, Ohio, to Bristoria, Pa., 43.5 miles—O. E. Dempsey Construction Co., Tulsa.

Section 17.—Bristoria to Connellsville, Pa., 43.5 miles—Williams Brothers, Tulsa.

Section 18.—Connellsville to Macdonaldton, Pa., 43.5 miles—O. C. Whittaker Co., Fort Worth, Tex.

Section 19.—Macdonaldton to McConnelsburg, Pa., 43.5 miles—I. C. Little, Dallas, Tex.

Section 20.—McConnelsburg to Gettysburg, Pa., 43.5 miles—Oklahoma Contracting Co., Dallas, Tex.

Section 21.—Gettysburg to Lancaster, Pa., 43.5 miles—Oklahoma Contracting Co., Dallas, Tex.

Section 22.—Lancaster to Phoenixville Junction, Pa., 43.5 miles—Oklahoma Contracting Co., Dallas, Tex.

Section 23.—Phoenixville Junction, Pa., to Lambertville, N. J., 45 miles—Midwestern Engineering & Construction Co., Tulsa.

Section 24.—Lambertville to Bayway and Bayonne, N. J., 17 miles—Jones & Brooks, Oklahoma City, Okla.

Section 25.—Phoenixville Junction to Marcus Hook and Point Breeze, Pa., length approximately 45 miles—Exeter Construction Co., Camp Hill, Pa.

Unloading, hauling and stringing of pipe will be divided between motor carriers, among whom the principal ones are: J. L. Cox & Son, Raytown, Co.; C. Hobson Dunn, Dallas, Tex.; Roy F. Parkhill Trucking Co., Tulsa, and J. R. Vandaveer, Neodesha, Kans.

Contracts for grounds surveys were awarded to: Huey & Cage, Monroe, La.; Lockwood, Kessler & Bartlett, Brooklyn, N. Y., and Midwestern Engineering & Construction Co., Tulsa.

Another Line Sole Answer to Eastern Oil-Supply Problem

WASHINGTON, D. C.—Sole answer to the problem of bringing East Coast supplies up to the more than 1,400,000 bbl. a day needed for civilian use and military operations across the Atlantic, "is the completion of transportation projects now under way and the building of an additional pipe line from the Southwest to the eastern seaboard to carry a minimum of 200,000 bbl. a day," Maj. J. R. Parten, chief of the Transportation Division, Office of Petroleum Coordinator, told the House oil subcommittee this week.

Major Parten explained that the additional line he mentioned was the same as the "second line" which has been discussed by Coordinator Ickes on previous occasions—a products line.

"Our goal," Major Parten said, "has been to deliver overland approximately 1,400,000 bbl. daily to the eastern seaboard, but in the light of increased offshore requirements on the North Atlantic Coast, it is clear that this figure will have to be raised materially in order to meet both essential domestic supply and offshore demands. Thus far we have been able to increase overland movements from some 50,000 bbl. a day in peacetime to in excess of 1,000,000 bbl. per day. To accomplish our objective, we have yet to gain overland not only about 400,000 bbl. daily, but also the volume which will be found necessary to meet these increased offshort requirements."

Major Parten's prepared statement was a com-

prehensive outline of the oil-transportation situation, not only to the East Coast but in all parts of the country, and covered all forms of transportation. He discussed the pipe-line shifts now being made, the construction of new lines from second-hand pipe, and all other phases of the transportation picture.

Both Major Parten and John V. Lawrence, managing director of the American Trucking Associations, a later witness, pointed out to the committee that there was a possibility that the requirement of a 35-mile speed limit for tank trucks wasted more gasoline and rubber than would a slightly higher speed.

Study Effect of Speed Limit

Rep. Pehr G. Holmes, Massachusetts, said he had heard reports to this effect, too, since trucks making 35 m.p.h. had to change gears for even the slightest grades, thus grinding away more rubber and using more gasoline. Major Parten said his division is making a study of the effect of the speed limit on gasoline and rubber use, and that a report is expected some time this month.

Representative Holmes showed some ire when Major Parten and other witnesses told him that many refineries were operating at a loss because of changed product yields, although OPC told OPA and other agencies more than 6 months ago that there should be some compensation for these changes. He was told that RFC had made arrangements to pay for transportation losses, but that none had yet been made for refiners.

The change in yield is vital to the people in the northern part of the country who may freeze to death this winter, Mr. Holmes declared, and added that if a congressional resolution is necessary to get aid for refiners he would introduce such a resolution.

Like Major Parten, Robert T. Collier, chief of OPC's Marketing Division, covered the activities of his unit, and also was questioned about the lack of compensation for refineries which are manufacturing less profitable products than before because of the national situation and on suggestions from Washington.

Another witness was J. J. Pelley, president of the Association of American Railroads, who presented detailed tables of the rail movement of petroleum products and asserted that "railroad management and employes are alive to the serious oil situation in District 1, and I can assure you they will do everything possible to increase the movement by rail."

Three witnesses from the Office of Defense Transportation appeared to explain the problems of moving petroleum via the various branches with which they were concerned. They were Henry F. McCarthy, director of traffic movement; E. R. Holzborn, assistant director in charge of waterways, and Sam F. Ninness, chief of the Petroleum Carrier Section (motor).

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Secondary Production Depends On Price Rise, Witnesses Say

LEADING off for a group of oil producers, operators, and others who appeared before the House petroleum subcommittee last week to urge a crude-price increase as well as assurance that the depletion allowance remain untouched was Donald P. Oak, Tulsa independent. He covered the need of increased prices to maintain secondary-recovery operations.

"At the time of Pearl Harbor," said Mr. Oak, who explained that he was manager of the first organized water-flood operation in the Mid-Continent, "it was evident to a number of operators that if no better crude prices were in sight, they would be financially better off to abandon their properties and salvage equipment, but not wishing to cause even a tiny ripple in the oil picture have hung on, often at a financial sacrifice to themselves. Now, with production declining, if the present fixed price is to be maintained, the limit has been reached in many cases."

He declared that 50 cents per barrel increase is needed to keep such projects in operation, and added that the secondary-recoverable reserves for Oklahoma alone is 900,000,000 bbl., but that practically none of this is available with the present price structure, that half of it can be recovered with a 50-cent increase and the remainder will require $1-a-barrel increase to make recovery economic.

In making these estimates, he said, a factor which is even more important than the crude price itself. "This is assurance that the present depletion allowance will be maintained," he said, explaining that in secondary recovery, a large percentage of the development costs often precede commensurate return by a year or more, "so the depletion allowance is absolutely essential."

Mr. Oak turned to another phase of the secondary-recovery program when he described the scarcity of cable tools and contractors as "the greatest bottleneck which I see in a rapid expansion program." Drillers have scattered, he said, and there have been inroads on those remaining, "such as reconditioning wells in California, shot-hole drilling in Alaska, etc. However, if tools and rigs are made available, and permanent work is assured, I do not believe the time required to overcome these obstacles would be great."

He described the manpower situation in secondary-recovery work as "critical," since returns have not warranted high wages, and as a result, pay is considerably below rates paid in nearby war activities. "It is necessary to get a price increase in order to pay our employes sufficient wages to hold the old ones and acquire new ones in an expansion program."

If it had not been for the war, the law of supply and demand would already have caused a price increase, he said, since the crude market changed from a buyer's to a seller's in 1941.

Wells Cannot Lie Fallow

Forest Dorn, president of the Forest Producing Co., Nowata, Okla., also covered the secondary-recovery picture briefly. He told the committee that secondary recovery is responsible for getting one-third of the oil from most sands and that secondary recovery must follow other production immediately, or the oil is lost forever. Oil wells cannot be left to lie fallow like farm lands if future production is to be assured, he told them.

Harold B. Fell, Ardmore, Okla., executive vice president of the Independent Petroleum Association of America, told the committee about the declining supply of crude oil, due to failure of wildcatters to discover more new production. He said that so far in 1942, the demand has required the withdrawal of approximately 100,000 bbl. daily from storage, and that 1943 requirements will be considerably above the approximate demand of this year. Demand this year has been right around 4,000,000 bbl. daily, and next year it may reach 4,500,000 or even 5,000,000 bbl., he said.

The downward trend is partially attributable to the fact that it is getting harder and harder to discover new pools of any size, he said.

During the testimony of Mr. Fell, Representative Boren interrupted to point out that, instead of being treated as a "step-child" of mechanized war machines, oil should come first, as the "sire" of all these machines. He said that if we knew that a fourth, or any other percentage of steel mills or other factories fabricating war equipment were going out of business, we would be frantically building more. But in the oil industry, where it is known that a certain percentage of wells will become nonproducers each year, the Government seems to be taking the attitude that the industry itself can produce indefinitely.

Heavy Exports to Africa

By way of illustration of the importance of oil as ammunition, Mr. Boren said that two-thirds of the total tonnage shipped to North Africa in the present invasion has been petroleum products, and that, he said, takes into consideration men, tanks, and other equipment.

Mr. Fell also pointed out that the possibility of a serious petroleum shortage might be upon the country within a year, depending upon the rapidity with which troops and materiel are moved to the fighting fronts.

Another oil-industry witness was Howard P. Holmes, Dallas, Tex., president of the Two States Drilling Co., and general manager of South States Drilling Co., who told the committee that the primary problem of drillers was that of labor, and declared that "if the present rate of drilling operations is to be maintained, we must lose no more men, particularly those out of our highly skilled brackets. If we are to be asked to step up the rate of our operations, even by a very small percentage, we cannot do it immediately, and when we can, it must be done by raiding other labor pools for untrained men, which we in turn must train for our less responsible types of work."

The second problem of the drilling contractor, he said, is lack of materials. If the present machinery is to be kept in service, even to continue drilling only the number of wells being completed now, he said, "we must have repair parts readily available for our engines, pumps, draw works, hoists, and rotating equipment."

At the same time, there is a heavy cost in materials peculiar to the drilling business, such as bits, drill collars, drill pipe, wire lines, brake linings, fiber rope, drilling hose, and others. These items actually wear out, he told the committee, and cannot be used again.

Mr. Holmes, who is vice president of the American Association of Oilwell Drilling Contractors, said that the members of his association drill approximately 75 per cent of all rotary oil wells completed in this country annually, and declared:

"As a part of our contribution we have drilled most of the wildcats accounted for in the last year. I believe investigation will prove that the cost to the industry of this wildcat exploration has been very reasonable. Yet we, and a large part of our new development and exploration plan must slow down unless we retain our specially trained men, obtain materials and repair parts for capital machinery, and recover our costs of operation."

L. M. Moffitt, Shreveport, La., producer and driller, also described production conditions for the committee, and asked for an increase in the price of crude.

"The oil industry was in a depressed price situation at the time the price ceiling was fixed," he said. "The cost of finding and producing new oil to replace that we are now selling is greater than the price we are now receiving, and as a result it is liquidating a vital war industry on which the country must depend for supplies with which to conduct the war."

He recalled conditions in World War I, when, he said, "failure to maintain adequate reserves . . . resulted in a price increase to $3.50 per barrel before adequate production and reserves were again available."

J. P. Coleman, Wichita Falls, Tex., producer and a director of the Independent Petroleum Association of America, the North Texas Oil and Gas Association, and the Panhandle Producers and Royalty Owners Association, told the committee that "at the present frozen prices of crude the wildcatting necessary to find the needed reserves will not be done. The hope of a better price has been with us for 12 years, and this hope has caused much drilling that otherwise would not have been done. Now this hope is practically gone."

"At the present price of oil the independents do not have the money to drill enough wildcat wells. In our own case, when we get our oil checks at the end of each month, we meet our payrolls and other expenses, and then take the remainder down to our bank to pay on loans for past development costs. We just don't have any money left with which to explore for reserves to replace our present declining reserves. In fact, our business is in the process of liquidation. When any producer stops looking for new reserves he is liquidating his company."

Summing up, Mr. Coleman said that a higher crude price would do four things: (1) Stimulate additional wildcatting; (2) increase the use of secondary-recovery methods; (3) make it possible to drill up areas which do not now promise profit under the present price, and prevent the premature abandonment of stripper wells.

John L. Herschbach, Dallas, Tex., drilling contractor, appeared briefly before the committee to ask for a centralized authority over all oil activities, and for a crude-price increase.

At the close of last week's sessions, William R. Boyd, Jr., chairman of the Petroleum Industry War Council, was asked if he wanted to make a statement. He did, and it was brief. He declared that he did not think "we should gamble with the oil situation." He recalled the statement of Rubber Chief Jeffers, who had told the committee earlier rubber should not be "gambled" with.

There is only one way to get more oil and find out how much we can furnish for the war Mr. Boyd said, and that is to "drill holes." To drill holes, producers must be assured by the Government of some sort of an incentive and the materials to do the job. "I take the position," he said, "that the only way to get reserves is to pay the price for oil."

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Latin America Urged to Use U.S. Facilities to Find Oil

Observations of John D. Gill, director of the Atlantic Refining Co., on the desirability of expanding petroleum exploratory operations in Latin America are based on his conclusions following an extended investigation. He was a member of a commission of economists and scientists which visited practically every Latin-American country in 1941 under the sponsorship of the National Research Council.

NEW YORK.—Belief that almost any kind of oil exploration and development is preferable to none at all for Latin America was expressed by John A. Gill, director of the Atlantic Refining Co., at a round-table conference on "The Oil Problem of Latin America." The conference was one of a series on various industries being conducted recently under the auspices of the Latin-American Economic Institute at the Hotel Roosevelt, New York.

Mr. Gill likened the present situation in the countries south of the Rio Grande, where extensive, undiscovered deposits of oil are believed to exist, to an individual with his funds locked up. He said that it would be better for these countries to have some one develop these resources for them if they are unable to do so themselves regardless of the possibility of the export of profit. It at least would result in superior employment such as in Mexico where oil employes not only received higher wages than ever before but also higher wages than workers in other industries.

The fact that such a program should be undertaken without delay was stressed by Mr. Gill who said: "No man today knows how long oil is to be the dominant source of power." It is known, he added, that there is a vast supply of coal. If it becomes possible to obtain oil from coal cheaply enough there may not be a competitive place indefinitely for oil as it is produced today.

Mr. Gill saw vast possibilities for Latin America both in refining and producing but admitted that both required considerable capital and skilled personnel. Both prerequisites, particularly personnel, are especially available in this country where, for example, the largest number of exploration crews in history, equipped with the finest instruments available, are now engaged.

Exploration Widely Scattered

South America's known oil resources have been developed principally from surface indications with only a very small area having been explored with modern equipment. In addition, very little drilling, in proportion to the size of the prospective oil area, has been done. Some 66 wells have been drilled in Brazil with an area greater than that of the United States where as many as 32,000 wells, 3,000 of them exploratory, have been drilled in a single year.

Outside capital should be welcomed to finance these developments, not necessarily on capital's terms but on some mutually satisfactory basis. Even if the oil is exported it serves to promote exchange and therefore almost any exploitation is better than none. Mr. Gill cited the United States policy in this respect noting that the oil this country has sent abroad gave it things which were needed and which were available only from other countries.

To illustrate the value of foreign capital, he drew a parallel between investments from abroad and the general economic welfare of the Latin-American countries. Argentina, where United States and British investments average $182 per capita, rated highest. He compared their economic welfare on the basis of per capita gasoline consumption, a basis which was substantiated by correlating with bases developed by other economists. Some of his figures on gasoline consumption, in barrels per capita, follow: Argentina, 0.79; Brazil, 0.07; Chile, 0.20; Colombia, 0.15; Peru, 0.13; Uruguay, 0.41. and Venezuela, 0.39.

Progress Above Average

Latin America, including adjacent Trinidad, is already further advanced than the average from an oil development standpoint. While it has but 6 per cent of the world's population, last year it produced 15 per cent of its oil, it has 7 per cent of its refineries with 11 per cent of its refining capacity and runs about 11 per cent of all crude oil processed. It has an over-all favorable export balance in oil with production approximately treble and refining capacity approximately double internal consumption.

It does not hold as high a position as it once did in production, however. In 1908, Latin America produced 1.7 per cent of the world's oil. This proportion grew until 1921 when it reached its peak of 26.5 per cent. That year marked the entrance of the Mexican Government into the oil business and since then, Latin America's proportion of the total receded.

Mr. Gill's discussion was limited to the long-term aspect of the oil problem because, "if boats were available there would be no immediate problem. The armed forces have drawn so heavily on the tankships of the United Kingdom, the United States and Norway that only the most essential war needs of the United States and Latin America can be supplied."

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Oil Industry Excluded From Higher Maintenance Ratings

WASHINGTON, D. C.—Reports that all repair and maintenance projects, in every industry, would be granted an AA-1 rating have been discounted by Office of Petroleum Coordinator in so far as the oil industry is concerned.

In clarifying some of these reports (termed premature by OPC Materials Division officials), The Oil and Gas Journal was told that:

1. In cases of extreme urgency, a rating of AAA will be assigned to repair and maintenance projects in the oil industry; particularly in the producing and refining branches. AAA is much higher than AA-1, and is superior to even Army and Navy priorities.

2. Persons who have jumped to the conclusion that the AA-1 rating has been set up for purchase of refinery and other equipment without an 'extreme emergency" showing, are misadvised.

3. The Materials Division of OPC contacts the Special Rating Section of WPB on these "extreme urgency" cases, and usually gets them through.

An extreme emergency, to give an example, would be the case where a refinery making aviation gasoline or toluene, or some such war product, burned down, or was otherwise destroyed. Such a plant could get the highest priority rating for rebuilding.

However, ordinary repair and maintenance projects will have to go through the regular process, unless they can show "extreme urgency."

Oil Men Protest Rumored Shift of Coordinator

WASHINGTON, D. C.—Protests from the petroleum industry this week against removal of Harold L. Ickes as chief of the federal oil agency may have dissuaded President Roosevelt from a reorganization plan. Reports in Washington were that Coordinator Ickes was to become secretary of labor, that Paul V. McNutt, Social Security Administration chief would become secretary of the interior and that Frances Perkins would take over social security administration.

These reported shifts, leaving the Office of Petroleum Coordinator by inference without a chief executive, introduced several speculative possibilities. One rumor was that OPC would be consolidated with the War Production Board and that a new director would be appointed and cloaked with power similar to that delegated to William M. Jeffers, the rubber administrator.

Three men were mentioned most frequently as slated for the petroleum director's job: Bernard M. Baruch, chairman of the War Industries Board in World War I and more recently chairman of the special rubber committee; Joseph P. Kennedy of Boston, Mass., former ambassador to Great Britain, and H. W. Dodge, formerly vice president of the Texas Co. and now deputy director general for operations in the WPB.

Certain delay and possibly abolishment of any plan to shift Secretary Ickes from Department of the Interior to Labor was interpreted here Tuesday from remarks of President Roosevelt at his regular press conference. When he was asked whether Mr. Ickes would be moved to the labor post, Mr. Roosevelt said there was nothing on the fire. When someone suggested it might not be cooked yet, the president said there was nothing on the range. Reports from sources close to organized labor are that Ickes definitely has been offered the dual post of secretary of labor and head of the War Manpower Commission but that he is reluctant to accept unless he can also retain the post of petroleum coordinator or else have OPC strengthened, kept independent of WPB, and headed by a man of his choice.

Wires Ask Reconsideration

The White House Monday admitted that literally hundreds of protests against replacement of Secretary Ickes as director of the petroleum agency had been received from oil men in every producing state.

Contemplated cabinet changes probably would not mean that Mr. McNutt would become petroleum coordinator, nor that Mr. Ickes would continue in this capacity in his new cabinet post. The Office of Petroleum Coordinator might possibly be assigned to the Office of Economic Stabilization, headed by former Justice James F. Byrnes.

Persons close to labor and manpower developments are convinced that these cabinet shifts are under serious consideration. The White House refuses all comment except that reorganization of federal control over manpower is still being studied, and the three individuals concerned will not discuss the subject but none of them has issued a denial of the reports.

Reported Severance of Ickes From Oil Duties Deplored by Wolverton

WASHINGTON, D. C.—Representative Wolverton of Michigan, member of the House petroleum subcommittee, expressed regret that there was a possibility of Secretary Ickes leaving his oil job.

Breaking in on the testimony of Maj. J. R. Parten, OPC transportation chief, at this week's hearings of the committee, Mr. Wolverton said:

"It is unfortunate if what we hear through the newspapers of the possible transfer is true. No one who has ever come before this committee—and that's no reflection on any of the other agencies—has come armed with more definite information and facts than Mr. Ickes. That is due not only to his own ability but that of his staff.

"While there is a great need for a man of his character in the position to which he may be appointed, it would be a great loss if he were to be taken out of his post as Petroleum Coordinator at this time."

Reorganization of the War Manpower Commission has been under consideration for some weeks. The present plan, according to the reports, is to combine the WMC and certain agencies now under the FSA with the Department of Labor, which would put Mr. Ickes in charge of the direction of all problems concerning manpower supply and labor relations during the war. It is understood that the heads of both the American Federation of Labor and the Congress of Industrial Organizations, while first perturbed over these reports, have now approved them and have agreed to the appointment of Mr. Ickes.

Mr. Byrnes is understood to be studying for the president the entire organization of federal agencies connected with the war program, and a number of changes are under consideration. In addition to manpower, which is most pressing at the moment, there are the questions of centralizing authority over the petroleum industry and creation of a food administration. These matters have been pending for some weeks, and it is quite likely that determination on all three will be announced at the same time.

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Tire Quotas Liberalized for First Month of Mileage Curb

WASHINGTON, D. C.—Expanded passenger-car tire and tube quotas for December to meet needs in the first month of mileage rationing—the plan under which virtually all passenger cars become eligible to apply for needed recapping services or replacement tires—were announced last week by the Office of Price Administration.

The quota of passenger-car tire recapping service for December, however, has been reduced moderately, since the large quotas in October and November are believed already to have provided recaps for a large portion of the tires in need of them.

The total of passenger-car tires and recapping services combined is 2,301,342 for December, against 1,285,189 for November.

At the same time, OPA announces an increase in the truck-tire quota over the November level in a move to take care of unsatisfied applications of eligible truck operators accumulated and carried over from preceding months. Recapping quota for truck tires has been reduced since the accumulated demand was for replacement tires rather than recapping.

Truck replacement and recapping quotas together for December amount to 489,749, compared with 376,168 for November.

The December quota of Grade 1 passenger-car tires has been set at 126,097, against 60,513 in November. This grade includes the best quality new tires that, with a few exceptions, are available only for necessity replacements on cars that get a mileage ration of over 1,000 miles monthly.

Quota of Grade 2 tires, which are for cars that get a ration of between 560 and 1,000 miles monthly, is 368,000, compared with 134,470 for November. The Grade 2 quota previously covered only new tires with a retail list price less than 85 per cent of the maximum price of standard Grade 1 casings. Now it includes, in addition, "factory seconds" so marked by the manufacturer, all new tires manufactured before January 1, 1938, and tires that have run less than 1,000 miles but have gone far enough to wear off the mold marks.

A quota of 920,000 Grade 3 tires, a new category under the tire rationing regulations, has been set for December. This grade, which includes used tires, recapped tires and new tires made of reclaimed rubber, is for necessary replacements on cars with a mileage ration of 560 miles or less.

The quota of recapping services for passenger-car tires is 887,245 for December. The November quota, which included recapped tires as well as recapping services, was 1,090,206.

December truck replacement tire quota of 340,229 is not strictly comparable with the 179,460 provided for November, since all replacement tires, recapped as well as new, are chargeable against the larger quota set for next month. Only new tires come out of the comparable November quota.

STATE CAPITALS...

West Side Operators in East Texas Field Seek Injuction Against Water-Oil Ratio

THE INJUNCTION SUIT, threatened a week ago against the Railroad Commission's order restricting East Texas wells to a ratio of 1 bbl. oil to 10 bbl. net water, was filed in District Court in Austin, November 28. The suit was filed in Judge J. D. Moore's court by Fred Weeks, attorney representing Konawa Operating Co. et al including a group of operators owning properties on the west side of the field.

Basis for the suit is the alleged abrogation of the state's marginal-well law which places a floor under oil allowables. Earlier last week, operators had also claimed that the order amounted practically to "confiscation" of property as the restriction would put many now-profitable wells into the nonprofit class and force their abandonment.

Two Commissioners Sign Order

The water-oil order was signed by E. O. Thompson and Beauford H. Jester with Olin Culberson filing a dissenting opinion. The order would place oil production on a volumetric-withdrawal basis with the producer allowed to lift 10 bbl. of water with each barrel of oil produced. Net water production would be restricted to 10 times the well's oil allowable and only the amount of oil lifted with this amount of water could be produced daily. A well formerly allowed 15 bbl. of oil and producing 400 bbl. of water would be restricted to 165 bbl. total of fluid.

A recent opinion by Texas' attorney general held that the marginal-well statute prohibits the commission from restricting the production of oil from marginal wells and that this prohibition is not dependent upon the findings of the commission as to whether or not such restrictions would cause waste or premature abandonment of such wells. Even some in favor of the water-oil ratio plan were of the opinion the state legislature had tied the commission's hands as far as restricting the marginal-well production was concerned.

Culberson Explains Opposition to Order

Mr. Culberson favored the transfer of allowables from wells making large quantities of water to those comparatively water free as a solution of the problem. In addition, he said he felt the water-oil ratio plan would cause litigation and delay in accomplishing the objective of reducing the field's water output, and that it would cause abandonment of many west-side wells in the near future. Abandonment would be forced, according to Commissioner Culberson, when the restriction on the water-producing wells changed them to nonprofitable operations.

When the order was issued, Colonel Thompson pointed out that in his opinion there was no conflict with the state's marginal-well law because the rule sets out a method whereby an operator may comply and prevent avoidable waste. (Water production is on a net basis and if the operator returns a high enough percentage of the produced water to the formation, all of the allowable oil can be withdrawn.)

In discussing the situation previous to adoption of the water-oil ratio plan, Colonel Thompson compared it to the gas-oil ratio method of computing allowables now in force. He explained that 500 cu. ft. of gas at standard conditions would occupy 1.37 bbl. of space at reservoir conditions of 1,000 lb. per sq. in. and 141° F. This is the gas-oil ratio for the East Texas field. Highest per-well allowable in the field is 26 bbl. per day which has a total volumetric withdrawal of 61.62 bbl. daily. "All wells producing large volumes of fluid could either be reworked or produce daily their oil which could be produced while producing 61.62 bbl. total liquid." The water wells are located in an area where there is no free gas.

According to Texas law, the Railroad Commission must be given 5 days' notice on an injunction application. The matter of the application for a temporary injunction will thus come up for hearing at 9 a.m., December 4 before Judge Moore.

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OKLAHOMA

WALKER T. POUND, Oklahoma City, became chief conservation officer of the Oklahoma Corporation Commission December 1. Mr. Pound has served the commission since 1935. From 1936 until December 1941, he served as deputy conservation officer in charge of Oklahoma, Lincoln, Logan, Canadian, Cleveland and part of Payne counties. He became secretary of the commission in December 1941 and served in that capacity until his promotion Tuesday. Before joining the Oklahoma commission, Mr. Pound worked in West Texas, New Mexico and East Texas fields and later, during 1933 and 1934, he was receiver for the Kilbourne Oil Co.

WALKER T. POUND

LOUISIANA

ALLOWABLE PRODUCTION of 312,399 bbl. daily during December was authorized by the Conservation Department last week in its new proration order. The November allowable was 321,971 bbl. daily.

North Louisiana fields were assigned 85,019 bbl. of the state allowable compared to 88,067 bbl. in November. December allowable in South Louisiana is 227,380 bbl. daily against 233,904 bbl. in November.

TEXAS

PERSONNEL CHANGES in the organization of the Railroad Commission, the result of election of Beauford Jester to replace Jerry Sadler, were announced last week.

C. W. Strance of Corsicana was appointed deputy supervisor of the commission's Oil and Gas Division, replacing Major Jones of the Palestine office, and Wallace Scott of Austin becomes deputy supervisor in charge of the Austin office.

Lawrence D. Ransom of Corsicana has been made secretary of the commission, succeeding Ted Read, former Kilgore newspaper man. Jim Kilday of Houston, formerly director of the Motor Transportation Division and the man whose appointment Mr. Sadler sought to fill out his unexpired term when he went into active military service, has been replaced by Wallace Hughston of McKinney. Mr. Hughston, whose new duties entail supervision of the truck and bus regulatory functions of the commission, served briefly in the state senate in 1935 and resigned to accept a post with the Federal Housing Administration.

PRECEDENT MAY BE SET if the Railroad Commission approves proposals to assign allowable for four wells to each producer completed on a labor of land (177.1 acres) in the Slaughter field in Cochran, Hockley and Terry counties, Texas. The proposed modification of field rules is to be considered at a hearing in Austin December 10. Heretofore, operators have been limited to the allowable for a standard unit, even though they did not elect to drill to the permitted density.

KANSAS

PURCHASERS last week nominated to buy 331,532 bbl. daily during December in making their commitments to the Corporation Commission. Buyers asked for slightly more oil this month than in November when nominations totaled 330,833 bbl. daily. The December quota for all petroleum products issued earlier by the Office of Petroleum Coordinator calls for production of 300,700 bbl. daily.

The OIL AND GAS JOURNAL

PRODUCING REFINING NATURAL GASOLINE PIPE LINE

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End The Impasse

As this is written, Washington reports are in agreement that the first major shake-up in the war cabinet, expected daily, will bring changes in the Government's administration of petroleum including the probable loss of Petroleum Coordinator Ickes. The guesses as to what will be done include practically all the possibilities.

The support given Mr. Ickes by the petroleum industry over the past 18 months is generally known. This publication reflected the viewpoint of operators months ago when it called for his appointment to the War Production Board where he could have better served everyone concerned with oil.

The industry still believes that given the needed powers the petroleum coordinator could effectively administer oil operations and bring about revisions in plans which should be made effective now.

But the needs of the oil business in relation to the war effort transcend personalities and political fortunes and what the petroleum industry, its military consumers, and its millions of rationed customers in civilian life, want is for official Washington to get off dead center and do what it must know has to be done.

If those who make the final decisions feel that the present coordinator is needed elsewhere, they should take the responsibility of that decision quickly and appoint from the petroleum industry, a successor who would head a centralized agency so located in the war framework and so empowered that it could effectively meet the oncoming problems of oil, many of which have been accumulating for months.

A factual study of what has happened during the first year of the war would show that the oil business at the request of war agencies has spent most of its time plugging holes created by overnight developments.

The shutting off of natural-rubber supplies put refiners at work on a billion-dollar synthetic-rubber enterprise. It has brought rationing and major changes in plant operations. In another year these same refiners are scheduled to be manufacturing high-octane gasolines at a rate approximately equal to the production of all gasolines in this country two decades ago. Another division has been engaged in offsetting the drastic reduction in tanker transportation.

No one complains of what has been done or will be done in taking care of these situations which were not anticipated. The Office of Petroleum Coordinator deserves great credit for what it has been able to do in assisting the Government and the oil industry.

At the same time it is apparent that these emergencies have obscured the needs of the petroleum industry as a whole. Washington insisted that because large quantities of materials were needed to build plants, tankers, and pipe lines an offset should be obtained within the industry. As a result drilling has been reduced 50 per cent and refiners have been allocated the minimum materials for established plant operations.

Pipe-line operators unless they were part of the emergency program have gotten along with what they had. No consideration has been given to the increased costs in all divisions of operations.

Operators know this can't go on. In 1943 and later, action must be taken looking to the resumption of these vital operations which are the backbone of everything the industry will do in connection with war.

It means more exploration, more drilling, more plant facilities, and more pipe lines in the fields. Unless this is done support for the industry's war responsibilities will collapse at its source.

OPC has realized these basic conditions but the authority to do something about it has rested with others. This is Washington's weakness in oil. How it is corrected is secondary to seeing that it is done.

WILLIAM STAMPS FARISH 1881-1942

DEATH early last Sunday morning claimed William Stamps Farish, 61, president of the Standard Oil Co. (New Jersey), the world's largest petroleum enterprise and marked the first "war casualty" among the nation's top operating oil executives.

Mr. Farish had been in the front rank of practically every action to assure the United Nations of the petroleum supplies necessary to win the war. His physical resources had been drawn upon at an inordinately high rate during recent months. In addition to keeping pace with the increased tempo of operations resulting from the war, Mr. Farish had spearheaded defense of his company and others against attacks by the Department of Justice.

There is no question, declare those in close personal association with Mr. Farish during recent months, that the task of guiding the industrial empire he headed into the most effective war service and, at the same time, fending off what he was convinced was an unfair attack, taxed his vitality beyond all reasonable limits.

Served in First War

This was the second war in which Mr. Farish had given unstintingly of his time and effort. During World War 1 he was a member of the National Petroleum War Service Committee, representing the producers of Louisiana and Texas. When the Petroleum Industry War Council was organized in the middle of 1941, Mr. Farish became one of 72 members and headed the standing committee on protection of plant facilities. Also, he was a member of the standing committee on petroleum economics, a field in which he had excelled for a number of years.

Mr. Farish had been the chief operating officer of Standard of New Jersey since 1937 when he replaced Walter C. Teagle in that position. For 4 previous years he had been chairman of the board. Acceptance of the chairmanship and later the presidency of the top company in the world-wide Jersey company organization, entailed change of residence from Houston, Tex., to New York.

The fatal heart attack was suffered by Mr. Farish in Middlebrook, N. Y., where, several hours before he awakened ill, he had retired in normal health. He died at a Middlebrook hospital at 2:30 a.m., November 29.

Mr. Farish started his career in the petroleum industry at Beaumont, Tex., in 1901, a few months after graduation from the University of Mississippi with a bachelor of law degree. After practicing law 3 months in Clarksdale, Miss., Mr. Farish recognized the opportunities in the Texas oil industry which was attracting scores of men from all parts of the country because of the spectacular performance of Spindletop.

When Mr. Farish first went to Beaumont, he was employed by the Texas Oilfield, Ltd. After a year with this company, he decided to rely on his own initiative and was instrumental in forming the Brown-Farish Oil Co.

Mr. Farish moved to Houston in the summer of 1905 and there became a partner with R. L. Blaffer in producing and contracting operations. It is told of them that they operated for years—in fact until their properties were merged in the Humble Oil & Refining Co.—without a written contract. Mr. Blaffer died late in October of a heart attack.

In March, 1917, Mr. Farish and others joined in forming the Humble company. He remained with the continuing organization and became it first vice president. In October, 1922, he was elected president of the Humble company and continued at the helm of the concern during the next 11 years, a period during which it expanded into one of the largest producing and refining organizations in the Southwest.

Became Director in 1927

First policy-forming duties with Standard of New Jersey were accepted by Mr. Farish in 1927 when he became a member of the so-called big board. Six years later, as chairman of the board, he started intensive preparation for the job of president, the chief operating officer in the Jersey company organization.

Certain permanent advantages of close interindustry relationships achieved by oil men during World War 1 were recognized by Mr. Farish and other members of the National Petroleum War Service Committee. This knowledge led to organization of the American Petroleum Institute in 1919, an epoch in oil-industry history in which Mr. Farish participated. He became president of the Institute in 1926 and served as a director and as a member of the executive committee throughout his life.

Following brief funeral services in the East at which directors of Standard of New Jersey were honorary pallbearers, the body was returned to Houston this week for burial there in Glenwood Cemetery.

Attractions of the southland, where he was born and where all but the past 9 years of his life were spent, never dulled in the memory of Mr. Farish. About the only real relaxation Mr. Farish enjoyed during the past few years as duties of high office demanded more and more of his time were the few weeks set aside each year for hunting, frequently with Mr. Teagle as a companion, in Texas, Georgia, Mississippi and Louisiana.

Survivors include his widow, Mrs. Libbie Randon Rice Farish; a son, Lt. William S. Farish, Jr., of the Army Air Forces, and a daughter, Mrs. Martha Botts Gerry.

Opponents Lose First Round In Fight Against Rationing

By HENRY D. RALPH

WASHINGTON, D. C.—The congressional bloc opposing nation-wide gasoline rationing lost the first round last week end when the administration refused to yield. Assurances were given, however, that the rationing system would be administered fairly and with consideration to local conditions.

Administration moves which overcame the opposition from western states congressmen included:

1. A letter from President Roosevelt to Rubber Director William M. Jeffers and Price Administrator Leon Henderson instructing them to proceed with rationing plans.

2. Nation-wide broadcasts by these two officials explaining the necessity for rationing and their determination to proceed as scheduled.

3. Appearance of these and other officials before congressional committees investigating the subject.

As the congressional bloc admitted it had abandoned hope of legislation to prevent rationing from going into effect December 1, its spokesmen hinted that it might seek action through restrictions to be written into the appropriation bill for the Office of Price Administration when that measure comes before Congress next spring. This legislation, however, will not become effective until the beginning of the new fiscal year July 1, 1943, and by that time the tire and transportation system may be much different.

Witnesses in Agreement

Investigation of gasoline and fuel-oil rationing was opened in Washington Friday by the Senate committee probing the national-defense program, headed by Sen. Harry S. Truman of Missouri, following which the committee left for the Middle West where it heard opponents of rationing in Kansas City Monday and at other points later this week.

Witnesses at the hearing November 27, included Rubber Director Jeffers, Price Administrator Henderson, Petroleum Coordinator Ickes, and Transportation Director Eastman. All told substantially the same story—that tires must be conserved, that gasoline rationing is the only practical way to achieve this and that the rationing system would be applied as fairly as possible.

Opening the hearing, Mr. Jeffers read a prepared statement, reviewing in large measure his testimony earlier in the week before the House petroleum subcommittee to the effect that stocks of natural crude rubber will be near exhaustion by the fall of 1943 before synthetic-rubber production is available in volume. He warned that the difficulties in reaching capacity production might delay full output from the synthetic plants in which case new tires would not be available until the middle of 1944.

Director Jeffers stated that present plans are to provide 30,000,000 tires for civilian passenger cars and commercial vehicles during 1943. While this is about the same number as the tires used for replacement purposes during a normal year, he explained that the mileage to be expected from them is far below normal because only 13,000,000 will be new tires from inventory and usable tires acquired under the idle tire purchase program, while 6,000,000 will be new tires made of reclaimed rubber and 11,000,000 will be retreads on existing carcasses.

He told the committee he has directed OPA and ODT to make changes in their rationing and mileage control plans to insure that workers and farmers obtain sufficient mileage and to permit flexibility in administration based on local conditions.

This is not a gasoline-rationing program but a rubber-conservation program, Mr. Jeffers told the Truman committee in answer to questions. Its object is not to take cars off the road but to keep them all on the road if possible. A breakdown in rubber-borne transportation would be more of a disaster for this country than a military defeat.

Mr. Jeffers said that the synthetic program is coming along very well but is now confronted with a conflict with the 100-octane aviation-gasoline projects, though he did not elaborate on this point. He also hinted that there may be difficulties in obtaining critical materials to complete the construction program on schedule, but he said he is convinced that rubber is the most important war program regardless of the needs of the armed forces for critical materials. The only qualifications to early and successful completion of the synthetic program, he said, is the possibility of demands of the armed services for steel and equipment earmarked for the rubber plants, and the "bugs" which may develop in the processes before they get into capacity production. Since many of the processes have gone directly from the test tube to commercial scale without the benefit of pilot-plant experience, he explained that full output cannot be expected immediately after scheduled completion dates.

The first unit of the alcohol-butadiene program will come into production early in January and this will permit experimenting to determine just how to operate the other plants of this process which will be completed during the spring and how much production can be expected from them.

There is not much question that the petroleum-base butadiene plants will come in as scheduled and will produce as expected, the rubber director declared. Also there are no technical problems connected with the neoprene program. But we must gamble until all the new plants are in production, he said, and therefore we must take no chances with present tires since it is better to be safe than sorry.

By the spring of 1944, Mr. Jeffers told the committee, it should be possible to relax the definition of essential driving.

Turning to the rationing program, Mr. Jeffers said that during the next year or so it is essential to limit speed and mileage and to require careful use of tires, and the only way to limit mileage is to limit the gasoline which provides the mileage. He admitted that this is "rough justice," but insisted that common sense administration would provide for the greater distances and heavier dependence on motor travel in the West as compared with the gasoline restrictions which have prevailed in the East. He said he is confident the local rationing boards will use good judgment if they are not tied down by administrative restrictions, and he outlined instructions he has given OPA and ODT to insure this flexibility.

The campaign in the Middle West against gasoline rationing was based, he said on the unfortunate notion that the 35-mile speed limit will accomplish the desired rubber savings, and while not exactly subversive was financed by people who ought to know better and who misguided the workers and farmers who were induced to sign thousands of printed postcards protesting rationing. Mr. Jeffers said these protests do not represent the true feelings of workers and farmers, and he expressed confidence that the public will cooperate in the mileage limitation program when they find out it is being administered fairly.

Program Being Decentralized

Leon Henderson, who is administering the gasoline-rationing program under the general direction of Mr. Jeffers, told the committee that the rationing program was being decentralized and made sufficiently flexible to meet the requirements of local situations. Its purpose, he said, is to maintain transportation and to see that workers get to work and that farmers can produce and market their crops. He predicted great liberality in fixing gasoline rations by the local boards, so much so that the restrictions may have to be tightened later on in order to bring the average operation of passenger cars down to 5,000 miles per year as stipulated by the Baruch report.

Voluntary curtailment of driving will not meet the standards of the Baruch report nor of the current rubber situation, Mr. Henderson insisted. In the unrationed territory the consumption of gasoline in September 1942 was 18 per cent under September 1941, but in the East there was a 43 per cent reduction, all of it in driving not essential to the war. He declared that the country cannot afford that difference in the unrationed territory, particularly since every automobile use essential to the war has increased while the rubber available has decreased.

Director Eastman explained to the committee the system of controlling mileage of commercial vehicles through certificates of war necessity issued under ODT Order 21. These certificates must be possessed by every commercial vehicle and measure the amount of gasoline and eligibility for tires to be rationed by the local ration boards under OPA jurisdiction. In answer to many complaints of severe and impractical restrictions on trucks, Mr. Eastman declared that every effort is being made to insure a liberal interpretation and application of the regulations on essential services and on return-load requirements, particularly as they apply to farmers who do not keep records of their past mileage and operations.

(Continued on Page 22)

Refinery Revenue Cut $190,000,000 Annually By Restricted Economy

By J. P. O'DONNELL

NEW YORK.—When the Office of Price Administration issued Order 88 on February 2, 1942, establishing ceilings on oil prices at their October 1, 1941, level, none of the changes that were to have such a pronounced effect on the value of refined products had yet reached a decisive stage. These changes since have resulted in a diminution of the value of refined products that has not been offset by corresponding changes in prices that would have taken place under an unrestricted economy.

The effect of changes in refinery operations under established price ceilings is shown in the following comparison of the value of refined products in 1941 with their value in 1942 under ceiling prices and changed operating conditions:

1. Under operating conditions as they existed last year and at prices prevailing October 1, 1941, the refining division of the industry would have received for products an average of $2.16 per barrel of oil run to stills.

2. Under operating conditions as they have been altered during 1942 and at prices as they existed as of October 1, 1941, the refining division has been limited to a maximum of $2.02 per barrel of oil run to stills.

Thus, with prices frozen but with operating conditions changed, the per-barrel revenue of the refining division has been reduced 14 cents as a result of its compliance with governmental directives and its inability to offset the effects of this compliance with changes in prices.

In the 6 months from April to September, inclusive, a total of 678,532,000 bbl. of crude oil were run to stills at United States refineries, an average of 3,708,000 bbl. per day. With the value of products reduced 14 cents per barrel, this is equivalent to $520,000 per day or $190,000,000 annually.

Revenue Even Less

Actually, of course, the revenue received by the refining division is even less because of its inability, in some instances, to maintain prices at ceiling levels. Competitive conditions and supply and demand relatonships have resulted in lower than ceiling prices for specific products in some areas. These below-ceiling prices have had the effect of reducing the over-all value of refined products to $1.94 per barrel in contrast to $2.02, the maximum possible under existing ceilings and operating conditions.

By adding this additional 8-cent-per-barrel reduction in the value of refined products to the 14-cent reduction resulting from operating changes and the inability of the industry to make price corrections for these changes, the total decline from last year's average refinery revenue becomes 22 cents per barrel. On the previously mentioned basis of 3,708,000 bbl. of oil run to stills per day, this is equivalent to more than $800,000 per day or an actual drop of slightly less than $300,000,000 annually in refinery-division revenue.

The changes in operating conditions which have brought about a reduction in the over-all value of refined products under limited prices are:

1. Change in the relationship of production of specific products by refinery areas. This change has shifted the proportion of runs from one refining district to another and thereby upset the normal relationship of the various areas. The East Coast and Gulf Coast proportion of the total, for example, has declined while that of other areas has increased.

2. Change in the yield of products refined from crude oil. The yield of gasoline, for example, declined from 44.6 per cent in September 1941 to 38.9 in September 1942, while distillate increased from 13.2 to 15.9 and residual fuel oil from 23.1 to 26.8 per cent.

Extent of Change

The first factor, on the basis of these calculations, had the effect of reducing the value of refined products and, therefore, the over-all gross refinery income, nearly 6 cents per barrel. The extent of this change is apparent from a comparison of runs by districts for September of this year and the same month of last year. In September 1942 the East Coast, Texas, Louisiana and Arkansas refining districts processed only 43.9 per cent of all crude oil charged, whereas in the same month of last year they ran 51.7 per cent of all crude oil charged to stills in this country.

The second factor, calculated on the basis of ceiling prices applied to the various products in their altered proportion, resulted in a decrease in the over-all refinery income of 8 cents per barrel.

These losses are the direct result of the OPA order freezing prices at abritrary levels and the industry's compliance with governmental directives reducing the production of higher-value products. The inability to maintain prices at ceiling levels which caused another 8-cent reduction in the over-all value of refined products is also a result, though less direct, of the war.

The most important instance of subceiling prices is on the Gulf Coast, where gasoline quotations are well below the OPA-prescribed levels. These prices dropped as a result of the accumulation of excess stocks which, in turn, developed as a result of the curtailment in deliveries to the East Coast, the principal market for products produced in the Gulf Coast refining district. The curtailment of deliveries to the East Coast was caused by tanker losses and withdrawals and the inability to develop adequate substitute means of transportation.

Therefore the revenue of the refining division of the industry has been reduced both directly and indirectly by the war. So far this reduction has amounted to more than 10 per cent. With a rigid price ceiling in effect and with a more pronounced change in product yields in prospect, the indications are that this loss will become even greater.

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Opponents Lose First Round In Fight Against Rationing

(Continued from Page 21)

Declarations of antigasoline-rationing congressmen on the subject reached a high pitch on the floor of the House the day following the president's letter.

Representative Anderson, of New Mexico, castigated Washington newspapers which had termed the antirationing bloc a "gas gang," and said that he thought it "too bad that 150 or 160 members of this House, certainly a majority of those now in Washington, meeting to consider this question, should be termed 'a gang.'"

"I also think," Mr. Anderson said, "it is too bad that the rubber director, Mr. Jeffers, should take it upon himself to try to appeal sentimentally to our people upon this question. Mr. Jeffers in his radio talk . . . referred to the saving of the life of Capt. Eddie Rickenbacker, something in which we all take tremendous pride. He pointed out that Mr. Rickenbacker had been saved by a rubber lifeboat and then said:

"Those were your new tires that saved Eddie Rickenbacker.

"I suggest to the members of the House that there is not one word in the records of the director of rubber, not one word in the records of the War Department, or one word anywhere else, that would indicate that that lifeboat was made possible by the present or contemplated rationing of gasoline."

Mr. Anderson also was critical of OPA Director Henderson's statement that rationing opponents were either "ignorant" or "intentionally traitorous."

"This means," he said, "that every farmer in the United States, every working man in the United States, every person in this country who has literally flooded Congress with letters and telegrams, is either ignorant or a traitor. I think Mr. Henderson should start now to prove that sort of a statement. The facts might be that he would run into some very embarrassing facts if he did."

Another speaker on the floor was Representative Hebert, of Louisiana, who asked:

"When will the effrontery, the audacity, and the insolence of the bull-in-the-china-closet of American unity, Leon Henderson, ever cease?"

Mr. Hebert said he is opposed to nation-wide rationing at this time, "and I will continue to oppose it until such time as I am convinced that it is absolutely necessary in the prosecution of this war. Dare Mr. Henderson call me a traitor?"

Representatives Wickersham, Jed Johnson and Boren, all of Oklahoma, also spoke against rationing. Mr. Wickersham declared that if Jeffers were a direct representative of the people "he would be more careful about some of the statements he has made."

Mr. Johnson said "I am sure you will agree with me that people generally do not take anything Leon Henderson says seriously." Representative Boren, who sat in on the hearings earlier in the week of the House oil subcommittee, asserted that "the method of rationing a product in which there exists a surplus of supply in order to control the allocation of a product in which there is a shortage of supply seems to be an indirect method, absurd and full of inequities."

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Burdette Blue Reelected Head Of Kansas-Oklahoma Oil Group

ALL officers of the Kansas-Oklahoma Division of the Mid-Continent Oil and Gas Association were reelected at the annual meeting of the executive committee of the association at Tulsa Tuesday. They are:

Burdette Blue, Tulsa, president; L. G. Owen, Carter Oil Co., Tulsa, first vice president; E. B. Shawver, Wichita, vice president for western Kansas; Carl Weiner, Chanute, vice president for eastern Kansas; A. W. Ambrose, Cities Service Oil Co., Bartlesville, vice president for northern Oklahoma; Lloyd Noble, Noble Drilling Corp., Ardmore, vice president for southern Oklahoma; W. R. Wallace, Magnolia Petroleum Co., Oklahoma City, vice president for western Oklahoma, and Clarel B. Mapes, secretary-treasurer.

C. L. Henderson, Vickers Petroleum Co., Wichita, Kans., was elected a member of the Oklahoma-Kansas Division representation on the board of directors of the general Mid-Continent association. All other representatives to the general board were reelected with the exception of Robert S. Kerr, Kerlyn Oil Co., Oklahoma City, Okla., who retired because of his recent election as governor of Oklahoma.

At the membership meeting five new members were elected to the executive committee filling vacancies created by retirements and deaths. The new members, all of Tulsa, are:

F. B. Carden, Home-Stake Oil & Gas Co.; Rush Greenslade, Gulf Oil Corp.; William Heldmar, Oil Well Supply Co.; Earle S. Porter, Amerada Petroleum Corp., and R. H. Wills, Mid-Continent Petroleum Corp.

Life memberships to the association were presented William O. Beall, president of the Osage Oil and Gas Lessee Association and lately retired from Sinclair Prairie Oil Co., and J. H. Hill, recently retired general counsel of the Texas Co., both of Tulsa.

Burdette Blue, Tulsa, independent operator, was reelected president of the Kansas-Oklahoma division, Mid-Continent Oil and Gas Association, at the executive committee meeting in Tulsa December 1

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Boyd Tribute to W. S. Farish Praises His Patriotic Service

WASHINGTON, D. C.—"I have known William S. Farish, president of the Standard Oil Co. (New Jersey) for many years, and the news of his sudden death comes as a profound shock to me as to the entire oil industry," said William R. Boyd, Jr., president of the American Petroleum Institute and chairman of the Petroleum Industry War Council. "The country has lost a real patriot, the petroleum industry has lost a stalwart leader, at a time when he was most needed.

"The great oil company of which he was president has lost a most able executive. He was a member of the National Petroleum War Service Committee in World War 1. He was one of the organizers of the American Petroleum Institute and he served as its president in 1926. He has been an active participant in every movement looking toward the solution of the country's oil problems, from the early days when he was a small oil producer in Texas, until his untimely death. He has been especially interested in problems relating to the conservation of oil and in the field of scientific research and developments.

"He was a member of the Petroleum Industry War Council and chairman of its important committee handling wartime problems related to the organized nation-wide protection of the oil industry's facilities from enemy action and subversive activities. He was an active leader in the developments of every war program."

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OPA Limits Roofing Flux Price in Two Refining Areas

WASHINGTON, D. C.—Maximum prices for roofing flux shipped from refineries in the El Dorado, Ark., and Mount Pleasant, Tex., areas were established November 30 by the Office of Price Administration at $8 per ton, f.o.b. refinery.

Previously these refineries were outside designated areas to which specific price ceilings on roofing flux were applicable. The refineries made few, if any, shipments to the East Coast and consequently had an inadequate basis for a price structure on shipments destined to that area.

Defined by OPA, roofing flux means any grade of soft or liquid asphalt having a melting point of less than 110° F., when sold to the roofing and floor-covering industry. It is used to saturate paper and other roofing and flooring materials.

The ceiling compares with $11.10 a ton f.o.b. refineries within 150 miles of the coast, enjoyed because of normally more advantageous shipping position.

The regulation is contained in Amendment 48 to Maximum Price Regulation 88—petroleum and petroleum products. Some of the important refineries in the area are the Talco Asphalt & Refining Co., Mount Pleasant, the Lion Oil & Refining Co. of El Dorado, Berry Asphalt Co. of Waterloo, Ark., MacMillan Petroleum Co. of Norphlet, Ark., and Bayou State Oil Corp., Hosston, La.

Truman Urges Refiners to State Facts on Fuel-Oil Supply

KANSAS CITY, Mo.—Middle West refiners here this week for the Truman committee investigation of interior fuel-oil conditions were urged to disregard warnings that the supply situation is a military secret and "get at the truth of the position."

Senator Truman of Missouri, chairman of a committee investigating defense activities, said that "the fuel-oil situation is not a military secret and we intend to get the facts on record."

Mayor John B. Gage of Kansas City headed a group opposed to fuel-oil rationing in this area. He has insisted for months that there is ample supply of fuel oil while coal is short.

Representatives of farm bureau organizations from Iowa and Missouri testified against rationing.

Senate Committee Approves Investigation of All Fuels

WASHINGTON, D. C.—The Senate interstate commerce committe Tuesday authorized appointment of a special five-man subcommittee to investigate the Mid-Continent fuel situation. A resolution was approved calling for five senators to study production, transportation and consumption of fuels in the area bounded by the Mississippi, the Rockies, Canada and Mexico.

Texas Co.'s Lockport Refinery Receiving $2,000,000 Expansion

Additions and improvements to the Texas Co.'s refinery at Lockport, Ill., costing $2,000,000 or more, are included in an expansion and improvement program. The contract for the program has been awarded to Foster Wheeler Corp.

While no details of the program were forthcoming, it is understood that it is in line with the general policy of the company in expanding its capacity for the production of war essential products.

Two Tankers Launched

NEW YORK.—Two more of the 10,750-ton Maritime Commission tankers were launched November 28 at the Bayonne, N. J., yard of Marine Maintenance Corp. Like others in this group, these tankers will bear names made famous in early American history and Princess Delvina and a delegation of Onondaga Indians from the Onondaga Reservation in western New York performed ceremonial rites at the launching. Completion of these two vessels raised the total number of tanker launchings for 1 month to a peak for the year.

Research that never sleeps

In the oil industry well directed research is always looking to the future and it never sleeps

Every present success achieved suggests and gives direction to study and discovery along new lines—challenges to further continued effort—to still greater successes

That is progress

For instance:

Years ago, when Dubbscracking had become the backbone of the refining industry the world over, Universal research leaders sensed that thermal cracking, though still useful, had its limitations They turned their eyes to the possibilities of catalysis

World famous chemists were brought to Universal and under their leadership a broad research program in catalysis was begun

The results are all-important

U.O.P. catalytic processes were developed which greatly improved yield and quality of motor fuel in peace time and which are now producing vital products that are helping to win the war

Those processes are available to every refiner under license from Universal

It's lucky for Uncle Sam and our allies that petroleum research did not rest on its oars

And it's still going on

OIL IS AMMUNITION—USE IT WISELY

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THE REFINERS INSTITUTE OF PETROLEUM TECHNOLOGY

Bureaucratic Restrictions on Finding New Reserves Must Be Lifted

By ALF M. LANDON
Former Governor of Kansas and 1936 Republican Candidate for President*

LANDON OBSERVATIONS

"Unless present war restrictions and regulations are changed, we face a shortage of crude necessary for war."

"The grave threat to our national supply is that we, this year, will drill only 18 to 19 thousand wells."

"Washington must recognize that we must have protection quickly for experienced and expert men."

"There is no justification any more under modern refining processes for the sliding scale of the price of crude oil based on gravity."

"The subsidy plan will be a catastrophic failure in developing vital new crude production."

RIGHT now, we in America are threatened with disaster by typically dumb bureaucracy. Unless present war restrictions and regulations are changed, we face a shortage of crude petroleum necessary for war. At the start, the oil shortage was one of faulty distribution. Now it is a matter of basic supply.

The oil industry knows that our potential daily production figures, as a result of bureaucratic mismanagement, are fictitious. This is because of the theoretical ways in which we arrive at our estimates. And it is done that way as a conservation measure.

It is fair and equitable because all interests are treated alike, but it does create a false picture of simply being able to turn on a spigot and get all the crude oil we need. And, if we produce any more than we are producing from the present wells, it will only create a greater shortage next year. We could temporarily increase our production to meet the demand. But there would be great waste in doing so as it would only lower our ability to meet the demand 90 days or 6 months from now.

The new pipe line from Texas to the East will probably be about 50,000 bbl. deficient, but there is available oil in Louisiana, and there will be some feeder lines connected up which will bring oil from North and Central Texas and connections made to West Texas and New Mexico would more than meet the requirements of the line. In addition to that considerable Gulf Coast oil can be converted to this line. But that does not increase the over-all supply.

More tankers will be made available for foreign services, but of course that does not get at the heart of the problem which is over-all basic lack of supply. This new government pipe line partly meets the problem of distribution, but not the problem of supply.

The grave threat to our vital national supply is that we this year will drill only about 18,000 to 19,000 wells. For the last few years we have averaged about 30,000 wells each year. The present rate of drilling was planned for us by one of our bureaucratic agencies at the beginning of this year. Good estimates place the new discoveries in 1940 at 1,894,717,000 bbl. In 1941 the amount of the new supply was 1,903,344,000 bbl. But in the first 6 months of 1942 the amount found in new fields and extensions of old fields was only 368,000,000 bbl.

The calm and dispassionate view of our deceptive potential daily production figures and the decline in new petroleum reserves is most disturbing to those familiar with the facts. Present production will not long support the demand unless the government bureaucrats take steps to reverse the present trend of development by removing some of the economic restrictions which retard development of new supply and recognizing that the oil industry must have a top rating in material and manpower, as a vital war industry. Secretary Ickes has recognized from the first that all this is essential to developing a supply adequate to our domestic needs and war demands.

Manpower

The question of manpower immediately enters the picture. Expert drilling crews are scattered into the Army and into war plants. It will be a long, difficult process to reassemble them so that new drilling can resume its stride of past years.

Washington must recognize that we must have protection quickly for experienced and expert men. Especially is that true for expert experienced men like drillers, pumpers, and production foremen. We must have the highest rating on equipment and experienced men to meet the nation's petroleum war requirements.

If the kind of labor a man does is the criterion of where he is to work, then there must be more and immediate consideration of the necessity of drilling and producing the crude oil vital to the war effort.

Of course, every man should be proud to be used where he is most valuable to his country. Those in charge of the nation's war production can only decide that. As Representative Cole pointed out to the president in his letter October 22, summing up 8 years of investigation of the oil industry, the great need is a centralized overall chief of wartime oil operations. The president in a letter on November 14 indicated he would create that centralized authority to take the place of the 50 different bureaus now confusing and interfering with obtaining increased crude-oil supplies. But by November 27 he had not acted.

One of the basic wrongs of the oil industry today is that the Office of Price Administration takes the earnings of some of the coordinated oil companies, many of their earnings are not from the industry itself, to govern the independent producer and the price of his only product—petroleum.

This program is strangling new development both in the drilling in developed fields, and has forced wildcatting to its lowest level in years.

Another thing wrong in the industry on the part of the big companies that reflects itself in lack of new development is the gravity base in their purchase of the crude oil from the thousands of independent producers.

There is no reason for the present sliding scale based on gravity. Modern cracking processes and refining methods can take the lower-gravity crudes and get as much out of them as they can the higher-gravity crudes. In some cases the low-gravity crude possesses more valuable products, especially for war purposes, than the highest-gravity crudes.

Subsidies

The subsidy plan for exploratory operations of one Washington bureaucrat means the same paralizing hand on future development in America. Bureaucrats are the same the world over. The genius of a people always disappears under their rule at every period of history. They are always getting in the way of the real workers. And the local policy does not apply alone to the oil business. It is already in general use to subsidize agriculture. It is proposed at every opportunity by some Washington bureaucrats in all businesses.

The subsidy scheme will be a catastrophic failure in developing vital new crude production and what is more important it will destroy at home everything we are fighting to protect.

The American oil producers do not want any subsidies. All they want is a square deal. Given that, a free hand, and equality in purchasing power, they will keep this country supplied with crude oil. The statement of the Grange opposing subsidies for agriculture applies with equal force to oil. The Grange in its national convention denounced subsidies because "they add to the national debt which must be paid by future generations. They conceal costs; they make everybody pay for the benefit of the few; they open the way for political abuses undermining the very foundation of free government. They promote inefficiency; and they tend to become permanent."

We cannot all share in the difficulties and the dangers of the war. But we all have in common our work to do. Most of us cannot hope to reach the extreme limit of wonderful service of the fighting men.

But we all have the same pride in our liberty. The pride of a country that has always inspired a successful war, stimulates us to great feats of production. The inactive man longs for the opportunity for action.

*Part of address delivered Monday night, November 30, Neodesha, Kans., at a celebration commemorating the fiftieth anniversary of the discovery of oil at Neodesha. This was the first oil discovered in commercial quantities west of Ohio and east of California.

Government Claims All New Interior Department Patents

WASHINGTON, D. C.—Patents developed by Interior Department employes covering new developments in petroleum drilling, refining, and transportation will be assigned to the federal Government. The rule applies to all other inventions by Interior employes developed on government time and with government equipment, the department announced last week.

Secretary Ickes has issued a formal order to the department's employes, "designed to secure for the people of the nation the full benefits of extensive governmental research and investigations."

"The Government, as employer and as representative of the people of the United States, should have ownership and control of any invention developed in the course of governmental activities," Mr. Ickes declared. "Therefore, each employe of each department whose duties are concerned with research or investigation is required to assign to the United States all rights to any invention made by him within the general scope of his governmental duties."

"An invention," the order stated, "will be considered within the general scope of governmental duties of an employe under the following conditions:

"1. When an employe's duties include research or investigation, or the supervision of research or investigation, and the inventions arose in the course of such research or investigation and is relevant to the general field of an inquiry to which the empolye was assigned.

"2. When the invention was in substantial degree made or developed through the use of government facilities or financing, or on government time, or through the aid of government information not available to the public."

While the department wishes to encourage and recognize individual achievement in research and investigation, employes who made inventions outside the scope of their government duties can receive assistance according to the secretary's order. Such inventions will be reviewed as to their merits and bearing upon the public good, and may be patented by the Government in an individual's name, and to his benefit and without cost to the individual, provided the invention is available for manufacture and use by the Government without the payment of royalties.

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Flanagan, Texas Co. Land Man, Retires From Service

After more than 25 years of service with the Texas Co., J. E. (Jack) Flanagan, one of Oklahoma's veteran land men and division land man for Oklahoma, Kansas, Illinois and Indiana, retired from active service on December 1.

Born in Parker's Landing, Pa., in November 1877, he moved with his family to Bradford, point of origin of many Oklahoma oil men, at the age of 10. He was in the printing business for 10 years before he came to Oklahoma in 1910, where he worked for a year for Donnelly Oil & Gas Co. under the supervision of W. L. Connelly, now chairman of the board of directors of Sinclair Prairie Oil Co. In 1912 he went into the oil business for himself, buying a producing lease in the Bird Creek area on which there was only one well. After drilling eight more producers on the lease, he sold out to an eastern concern. He was employed by Producers Oil Co. on January 1, 1917, as a scout. After scouting a year, he was made a lease man and was given charge of the land department November 1, 1919, and has continued in that position until retirement. During his tenure as head of the land department, Mr. Flanagan has seen many important changes take place in the oil business and has supervised many leading campaigns for his company, probably the largest of which was in Illinois, where his company is now a leading producer.

One of the most spectacular phases of his career has been his participation in the Osage lease sales. As representative of Texas Co., he attended all the important Osage sales and probably paid the Osage Indians more bonus money than any other one man.

Intensely interested in both hunting and fishing, Mr. Flanagan is also a member of the Tulsa Club and the Charity Club, a unique organization which holds weekly poker parties with a percentage of the winning going to charity. Married, but with no children, "Jack," as he is known to thousands, will continue to reside in Tulsa.

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Charles C. Brown Transferred To Tulsa Office of OPC

Charles C. Brown, assistant director of the Production Division for District 2 of the Office of Petroleum Coordinator for War is now located at the Tulsa offices. He has been at the Chicago headquarters of the division for several months. Seth W. Herndon, director, and Mark Patton, assistant director of the Natural Gas-Natural Gasoline Division of District 2 are also located in Tulsa. The offices are at 410 Beacon Life Building, local phone, 4-9181.

Sun's Butadiene Plant in Ohio to Cost About $3,000,000

WASHINGTON, D. C.—Secretary of Commerce Jones announced that Defense Plant Corp. had signed a contract with the Sun Oil Co. for construction of a $3,000,000 plant in Ohio.

From other sources it was learned that this is the butadiene plant Sun has started constructing at Toledo under authority of a letter of intent.

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DEATHS

ROBERT E. TRUMBULL, 60, master mechanic for Gulf Refining Co., Tulsa, died Thanksgiving Day after a heart attack.

W. B. CRUTCHER, 47, division superintendent for Carter Oil Co. at Seminole, Okla., died Sunday at a Tulsa hospital, after an extended illness. At the time of his death was in charge of Carter producing operations in Oklahoma and Kansas. He had been with Carter since 1929. His widow and a son survive.

JOHN WILLIAM PENHALE, 86, who started in the oil business with his father at the age of 15, at Pithole, Venango County, Pennsylvania, died at his home in Charleston, W. Va., last week. He became associated with United Fuel Gas Co. in 1909. Three sons and two daughters survive.

GEORGE J. W. KELLER, 54, long-time employe of the Southern Group Pipe Lines, died at his home in Oil City, Pa., last week, following a 2-week illness. Mr. Keller, an accountant, had been associated with his company for 42 years. His widow and two sons survive.

DARWIN S. DAILEY, 76, retired oil worker, died in Gifford, Pa., last week, following an illness of about a month. He had long been active in the production end of the oil business, and had retired 10 years ago. Five daughters and three sons survive.

JOHN E. SCOTT, 80, since 1913 head of J. E. Scott Valve Cup Manufacturing Co., died at Columbus, Ohio, recently. A native of Parkhill, Ont., he was associated with the late Harrison Corey in oil production at Petrolia, Ont.

A. W. GORDON, 100, independent oil producer of Tulsa, once named the "Grand Old Man of the Oil Industry," died Monday at his home in Tulsa. His death was attributed to natural causes growing out of advanced age. He had observed his one-hundredth birthday October 20. Mr. Gordon first went to work in the oil fields at the age of 18, in the vicinity of Pleasantville, Pa. He was an early associate of John D. Rockefeller, and was one of the organizers of Ohio Oil Co. He came to Tulsa in 1902, and retired in 1928. A son survives.

P. A. NORRIS, 79, who for the past 15 years was in the oil business near Ada, Okla., died at his home in Ada last week after an illness of 3 months. Mr. Norris rose from a $10-a-week job as clerk to become capitalist, manufacturer, landowner and oil man. During World War I he was fuel administrator for Oklahoma. His widow, four sons and four daughters survive.

HERMAN STABLER, 63, chief of the conservation branch of the U. S. Geological Survey, died November 24. A discoverer in the field of water analysis and disposal of commercial waste, and author of many treatises in his specialty, Mr. Stabler had been connected with the survey from 1903 until his death except for an interval from 1908 to 1910. As late as the summer of 1942, Mr. Stabler assisted the subcommittee of the Senate public lands committee in inquiring into the problem of increased oil and gas production, especially on public lands in the West. His widow survives.

R. O. MIDDLEBROOK, 85, Matagorda County, Texas, pioneer, died in Bay City, Tex., and was buried in Cedarville Cemetery. Mr. Middlebrook was active in promotion of the Clemville oil field near Bay City and had large cattle interests. He was credited with discovery of sulfur at Gulf, Tex., which became the largest sulfur mine in the world.

CHARLES BARRETT, 78, the first white child born in the oil town of Petrolia, Ont., died there resently. At one time he operated extensive oil properties there and with his brother, the late William Barrett, conducted the Barrett Cup Works, manufacturing oil-well equipment.

TIRY WILBUR HORN, 63, early independent operator in the Gulf Coast oil fields, died last week in his home in Houston, Tex., where he had resided since 1907. Before his retirement Mr. Horn operated in the Goose Creek, Humble, Spindletop, and West Columbia fields. He leaves his wife, a brother and a sister.

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Natural Gas News

Natural-Gas Limitations Extended to More States

WASHINGTON, D. C.—Delivery of natural gas to new residential consumers was prohibited after December 2 in several Kansas, Wyoming, and Utah counties by a War Production Board limitation order issued here last week. Restrictions apply to operation of space-heating equipment unless the consuming facilities were installed prior to December 2 or, in the case of new construction, the foundation is completed prior to December 18 and the equipment installed by March 1, 1943.

Utah counties affected are Weber, Morgan, Davis, Salt Lake, Utah, and Summit.

Wyoming counties in which the order applies are Uinta and Sweetwater.

Kansas counties brought under limitations are Lyons, Chase, Marion, Harvey, Reno, Pratt, Kiowa, Ford, Meade and Seward.

Oklahoma Natural Will Use High-Pressure Line Soon

A $1,200,000 gas line which will increase both supply and pressure in Tulsa is scheduled to be completed and put into service within the next 2 or 3 weeks, Oklahoma Natural Gas Co. officials said last week.

The line, officials explained, will eliminate any possibility of gas shortage or low-pressure conditions in the city.

The 100-mile 12-in. line, extending from the great gas supply in the Chickasha and Cement fields to O.N.G. transmission lines at Stroud, Okla., is now completed except for a crossing on the South Canadian River near Norman, Okla.

A specially built pipe-line bridge, 1,670 ft. long, is now under construction. Officials say it is one of the longest pipe-line bridges in this section. The new line also will increase the supply needed by the company to serve Camp Gruber, which originally was scheduled to take an average of about 12 million cubic feet daily. The line will provide an additional 65 million cubic feet daily for the system.

This line is the first one to be operated at high pressure in the Oklahoma Natural system. Gas will be introduced under 1,000 lb. pressure and have 375 lb. pressure at Stroud, making it unnecessary to boost pressure at the Kellyville, Okla., station except under extremely heavy load conditions.

Louisiana Commission Opposes Tennessee Line

The Louisiana Public Service Commission is opposing an application of the Tennessee Gas & Transmission Co., Inc., to build a natural-gas pipe line from Southwest Louisiana to industrial plants in Tennessee and Alabama.

The commission filed a petition with the Federal Power Commission asking to be allowed to intervene as an opponent, declaring that the legislature had directed opposition against construction of any further pipe line to transport gas outside the state.

"Continued unrestricted, unrestrained and indiscriminate withdrawals will result in an early depletion of the natural-gas reserves of Louisiana," the petition said. "Such a practice will constitute a most serious handicap and bar to the normal industrial development of the state and will prove socially and economically unsound as a natural policy when the proposed transmission is to areas already supplied with other fuels."

It is reported that Tennessee Gas & Transmission interests have approached owners of gas properties from which supplies would be drawn and in a number of cases have obtained letters stating the terms of contracts which would be made when the line is completed and ready to receive gas.

Bureau of Mines Helium Program Gains WPB Approval

WASHINGTON, D. C.—Interior Secretary Ickes has won his argument with the War Production Board over the continuance of work on the Bureau of Mines projects which were ordered cut off when the board issued an order several weeks ago halting all construction projects.

The department now announces that "a majority" of the bureau's wartime construction projects have been given the green light, following a hearing before the Facility Review Committee of WPB.

Ferdinand Eberstadt, vice chairman of WPB, wrote Secretary Ickes a letter advising that construction work on the bureau's helium plants, explosives research laboratory, synthetic-oil project, and pilot plants and laboratories working on aluminum may continue to completion, subject to limitations contained in previously issued preference-rating orders.

At the hearing held by the Facility Review Committee representatives of the Interior Department and of the Bureau of Mines urged that the construction work on all the bureau's projects essential to the war be continued.

Failure to have permitted construction work to proceed on the helium plants, it was pointed out, would have meant that the Army and Navy would be unable to obtain enough of this noninflammable, lightweight gas for its lighter-than-air craft and other uses, since the Bureau of Mines is the world's sole producer of helium. Construction is now proceeding at the bureau's well-known Texas plant and at five other sites.

Independent Rate Schedule to Arkansas Louisiana Suspended

WASHINGTON, D. C.—The Federal Power Commission last week announced an order (*a*) suspending a rate schedule submitted to the commission by the Independent Natural Gas Co., Bartlesville, Okla., which would increase rates for natural gas sold to Arkansas Louisiana Gas Co., Shreveport, La., and (*b*) setting a public hearing on the matter for 9:45 a.m., January 12, 1943, in the commission's hearing room in Washington.

The order states that "in purported justification of the proposed increased rates or charges. Independent Natural Gas Co. stated that it must make a substantial additional investment and will incur additional expenses in order to supply the increased volumes of natural gas provided for in the aforesaid supplemental rate schedule, and it was further stated that Independent Natural Gas Co. must pay increased amounts to Phillips Petroleum Co. for the purchase of the natural gas which it sells to Arkansas Louisiana Gas Co.; Independent Natural Gas Co. is a subsidiary of and is controlled by Phillips Petroleum Co." The order suspends the supplemental rate schedule "until April 26, 1943, or until such time thereafter as such increased rates or charges shall be made effective in the manner prescribed by the Natural Gas Act," and provides that interested state commissions may participate in the hearing.

Construction Started on Two Black Plants Near Guymon

Construction work was started last week on one completely new carbon-black plant and on an extension to one already in operation in the Hugoton gas field in Texas County, Oklahoma.

Cabot Carbon Co., authorized a month ago to build a carbon-black plant 2½ miles northeast of Guymon, Okla., by the Corporation Commission, has started construction operations. The new Cabot plant will process approximately 7,000,000 cu. ft. of gas daily with a yield of from 6 to 10 lb. of black per 1,000 ft.

General Atlas Carbon Co., operator of a plant north of Guymon, is doubling capacity of its installation. The new extension will have capacity of 3,500,000 cu. ft. daily.

Ambrose Heads District 2 Group on Joint-Facility Use

Organization of the OPC District 2 subcommittee on the joint use of natural-gas and natural-gasoline facilities has been completed with A. W. Ambrose, Cities Service Oil Co., Bartlesville, Okla., general chairman.

Other members of the committee are Joseph A. LaFortune, executive vice president, Warren Petroleum Corp., and C. U. Daniel, Oklahoma Natural Gas Co., Tulsa; J. H. Dyer, Continental Oil Co., Ponca City, Okla.; E. V. Kesinger, Natural Gas Pipeline Co. of America, Chicago; T. J. Strickler, Kansas City Gas Co., Kansas City, Mo., and W. C. Taggart, Taggart Brothers Co., Big Rapids, Mich.

Directory of Gas Utilities Published by Federal Board

WASHINGTON, D. C.—The Federal Power Commission has published its "Directory of Gas Utilities in the United States—1942." The 536-page book, which contains data on natural, manufactured, and mixed gas companies in the United States, was compiled by the commission in collaboration with the Work Projects Administration.

The wide coverage of the publication makes available a complete and authoritative list of all publicly and privately owned gas utilities in the country, as well as many industrial enterprises which sell gas for ultimate public consumption, together with pertinent operating and statistical data, and is a companion volume to the Commission's "Directory of Electric Utilities."

Three Subsidiaries Merged With Southern Union Gas Co.

CHICAGO.—Three operating subsidiaries in Oklahoma, Texas and New Mexico last week were merged into Southern Union Gas Co., the parent and continuing company. The three subsidiaries are New Mexico Gas Co., the New Mexico Eastern Gas Co., and the Texas Southwestern Gas Co.

Ross Byron, vice president, announced here that the merger, sanctioned by the Securities Exchange Commission, had been approved by stockholders.

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Rope Diameter	Number of Clips	Spacing of Clips	Length of Wrench
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¾" to ⅞"	5	5" to 5⅞"	18"
1" to 1⅛"	6	6½" to 7⅛"	24"
1¼" to 1⅜"	7	8" to 8⅝"	24"
1½"	8	9½"	24"

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Policies and Results of Water Flooding in Kansas

By PAUL REED

Water-flood operators differ to a marked extent in policies for applying this technique, now in a process of evolution. This article discusses results obtained in shallow as well as comparatively deep flooding in Kansas. A previous article appearing October 22, 1942, page 22, included a map showing location of principal water-flood projects.

NOW that water flooding has been conducted in Kansas on a fairly extensive scale for more than 4 years, there is an opportunity for reviewing some of the conspicuous features of results obtained by this technique.

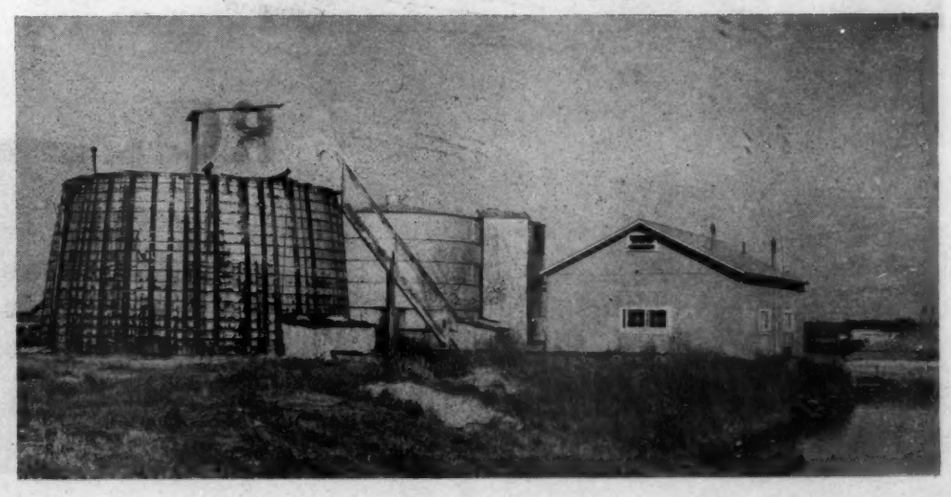
Before York State Oil Co. operated the first five-spot in the state in 1935, some flooding had been done, particularly in Chautauqua County where operators let water into producing sands by lifting or splitting casing. But it was not until the advantages of systematic flooding had been demonstrated in the Nowata field, Oklahoma, in 1936 that southeastern Kansas was influenced by procedures which had proved successful in Pennsylvania.

As it happened, the results obtained from the particular water-flooding ventures started in Kansas in 1936 were discouraging. One major company systematically developed and equipped a property for water flooding which had not been previously drilled because the high viscosity of the oil indicated that it could not be profitably operated by customary methods of primary production; water flooding there was soon abandoned. Another major company undertook water flooding as an experiment on an old marginal property producing 7 bbl. daily. At the end of 5 years production was 40 bbl. daily from 25 producing wells operated in connection with 22 input wells on 80 acres from Bartlesville sand at 351 to 383 ft. There has been no high peak production. Enough had been learned to induce this company to embark on an extensive water-flooding development program this year when Kansas water flooding promises to be important for supplying northern markets. The same year an independent operator started a small flood at the eastern end of the state.

During the next 2 years more than a dozen flood projects were started which represent the beginning of real activity in this type of secondary recovery in Kansas. Two more major company projects were started but the projects which have attracted the most attention have been those of independent Bradford, Pa., and Tulsa operators who made careful preliminary studies of the area before they acquired properties.

Those attracted to water flooding for the first time frequently underestimate the time and expense usually consumed in selecting and acquiring producing properties suitable for water flooding. It is now widely recognized that in order to make a profit out of flooding at prevailing prices for crude oil it is necessary to recover at least 3,000 bbl. per acre from sand with considerably more than 35 per cent saturation. In order to do this with the 330-ft. and 440-ft. spacing patterns commonly used, operators have been looking for sand bodies at depths less than 700 ft.

Water-treating plant of York State Oil Co., Greenwood County, Kansas, from which treated brine flows to input wells by gravity



containing oil of well above 30° A.P.I. Operators have found these conditions met to a larger extent in southeastern Kansas than in any other Mid-Continent area. There, the shoestring sands of fairly uniform and moderate permeability without the presence of a water table are well suited to water flooding.

Since 1935 practically all of the flood projects in Kansas have produced from sands of less than 700-ft. depth. However, results obtained by the economical methods employed in flooding York State Oil Co.'s property in the Seeley pool has stimulated new water-flooding activity in Greenwood County on the part of major companies this year.

In reviewing the first 5 years of water flooding it is seen that following the initial influx in 1936 and 1937 there was a steady expansion in the application of this technique. However, it was somewhat retarded by difficulties in finding outlets for production. Last year and this year, due to war conditions, there has been a definite acceleration of the trend to water flooding. Of the 33 projects of which records are available only nine showing a substantial increase were producing more than 100 bbl.

The typical successful water-flood property produced between 7 to 20 bbl. from 80 to 160 acres before flooding. It has been developed for water flooding according to a systematic plan which provides for adequate water-treating program and progressive extension of water flooding each year to parts of the property which had heretofore been unaffected by the drive. In this way the operating organization can be held together on a fairly permanent basis and the company can maintain production somewhere near the same levels from year to year. Although some operators favor producing by flowing throughout the life of the property in order to save the expense of pumping, the general practice is to pump during the early life of a property and flow during the last stages when the oil-water ratio is greater than 1 to 10. By such a progressive program it is possible to shift pumping equipment from flowing wells to wells in the newly flooded sections. Furthermore, this plan enables the company to profit by its experience so that more efficient methods may be applied as operations proceed. However, certain operators favor a policy of developing an entire property as rapidly as possible for water flooding in order that oil may be recovered in a short period of operation with a minimum of overhead.

Some of the features of floods which have attracted special attention are given in the following paragraphs.

Darby Lynde Co. started flooding operations in 1937 in parts of Sections 21, 22 and 27, Township 27s, Range 18e, near Chanute in Neosho County. The water plant built on the Kaney lease treats fresh water from a creek which is supplied to all of the company's flooding operations in the area. It produces from Bartlesville sand to a depth of 700 to 765 ft. The Kaney lease has passed its peak, pumping has been discontinued and the lease now produces approximately 15 bbl. daily from 31 wells. Most of the company's flooding is now being done on four leases to the north where more than 650 bbl. have been produced daily in recent months from 64 wells.

McIntyre & Travis began flooding operations on properties in the Alba pool, 10-24s-21e, in 1937. This company has succeeded in operating in the area north of Moran, Kans., where it is reported that other companies have had only moderate results or failures. At the beginning the firm obtained fresh water from a reservoir impounded by a dam. In recent months this project has been producing more than 400 bbl. daily from 66 wells on three Prue sand properties.

At this time there is particular interest in the results obtained by York State Oil Co., Sections 29, 32, and 33-22s-11e, in the Seeley pool, near Madison, in Greenwood County because of the economical and profitable nature of the undertaking which differs widely from others in Kansas.

York State Operations

Instead of selecting a property with a sand at a depth less than 700 ft. York State started water flooding Bartlesville sand at depths between 1,963 and 2,023 ft. Old wells were not plugged in order to prepare for 330-ft. or 440-ft. five-spot pattern commonly used in the shallower areas. Water is not injected with usual pressures between 300 and 600 lb. From the original five-spot started in 1935 and operated with water impounded by a dam the project has been expanded to 12 input wells which receive water from the treating plant by gravity. This year's production which recently has been 450 bbl. daily is approximately 30 per cent more than it was at the same time in 1941. Observation of results led to revising estimates of recovery from 5,000 bbl. per acre with a total of 600,000 bbl. for the property to 8,000 bbl. per acre with a total of 1,000,000 bbl. for the property.

The property has 120 acres of proven production on sand-bar lenses of the Bartlesville sand. Wells were originally drilled on 10-acre locations with 660-ft. spacing. The width of the pay horizon permitted the drilling of three rows of four wells each. Flooding is done by what is called the inverted five-spot method. The initial five-spot consisted of an input well drilled in the center of four producing wells at a part of the lease where the sand was thickest and where the initial flush production has been greatest.

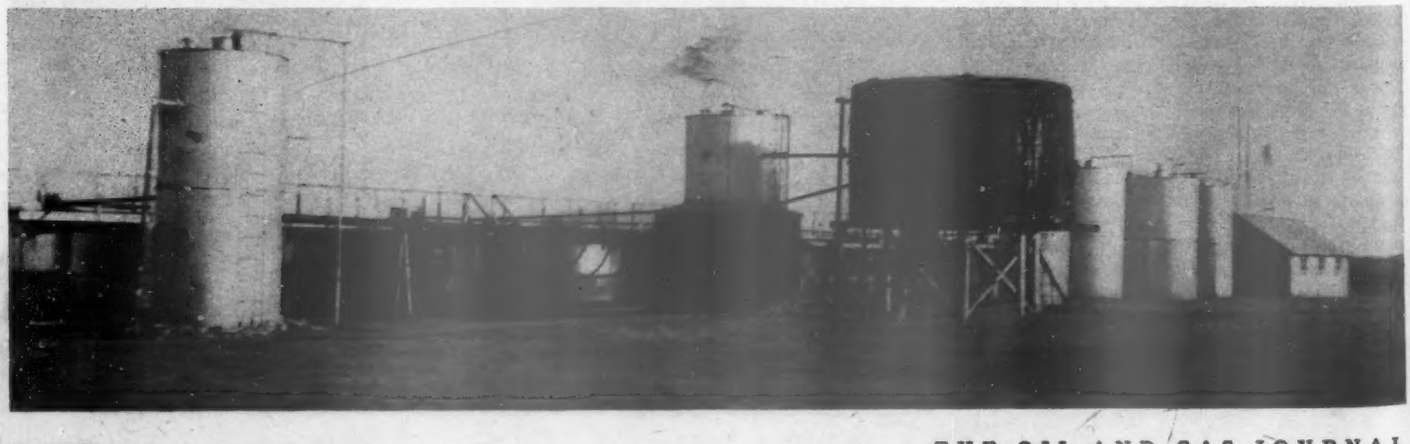
When the core of the first input well was analyzed it is reported that average pore space was found to be 20 per cent but that oil content was approximately only 240 bbl. per acre-foot. Water content was twice the oil content and it is believed that there was considerable displacement of oil by water in the course of coring by conventional coring-machine methods. Information obtained in later drilling and production operations show that there is a negligible amount of water in the sand except where it has entered because of flooding operations. Production obtained from water flooding leads to the present assumption that more will be recovered ultimately by this method than was estimated when the core was analyzed.

In the first years, the property had its ups and downs because of reliance on impounded rain water used for flooding purposes. It was not until the fall of 1940 that continuous operation was insured when provision was made for obtaining brine from the Big Water sand at 1,000 ft. depth. Brine obtained with oil-produc-

(Continued on Page 45)

Left: Equipment for pumping water to input wells on Vossler & Elliott property, Rantoul pool, Kansas

Below: Stock tanks and tanks for handling brine, produced with oil on York State property which is mixed with brine from 1,000-ft. sand before going to input wells



Methods of Combating Fires In Oil-Storage Tanks

By J. D. McCAMEY
Safety Engineer, Carter Oil Co.

This article is taken from a manual issued by the author's company to assist field employes in the protection of petroleum storage tanks. The material was collected from various sources considered by the writer to be authoritative, but its application as herein described is the writer's opinion only.

It should be pointed out that care of stored petroleum or its products is of importance regardless of conditions, and, should fire occur, extinguishing methods are the same regardless of whether ignition results from natural cause, carelessness, or a condition of war.

IT may be said that precautionary or preventive measures exercised in regular operating procedure are to be considered primary factors in keeping tank-fire loss at a minimum. Experience indicates that tank fires from any cause have practically been eliminated with the adoption of steel-roof tanks of either the cone, breathing, or floating type, if these are equipped in an approved manner.

Of equal importance is standard maintenance procedure adopted and followed so that the installation retains those fire-resistant qualities inherent in its design. This maintenance procedure is now of far greater importance than ever before.

Fire Walls or Dikes

Any tank or group of tanks to be used for crude-oil storage should have a surrounding fire wall, the minimum capacity of which is equal to that of the storage unit enclosed. Good practice dictates that the capacity of the fire wall around crude-petroleum storage should be 125 per cent of the storage capacity unless deflecting couplings are provided.

No vegetation should be permitted to grow between the inside toe of the dike and the tank shell and this area should be graded in such a manner that water from rainfall or other sources will drain to a point where there has been installed a drain pipe of sufficient capacity to eliminate the accumulation. These drains should be below actual ground level and equipped with a low-pressure valve placed outside of the fire wall and protected from freezing in a suitable manner. Drain valves should be closed at all times except when actually draining water from the dike.

Cone-Roof Tank Breathing and Venting Equipment

Cone-roof tank breathing and venting equipment incorporates in its design a flame-arresting screen or grid, a pressure-vacuum relief-vent valve and a manually operated butterfly or snuffer valve.

The flame-arresting screen or grid provides protection against flashback to the inside of the tank, from any outside ignition source. The snuffer valve, butterfly or clapper type, manually operated, provides a means for cutting off either incoming or outgoing gas for short spaces of time, thus providing a means of extinguishing vapors which might be burning at the vent. The other valves protect the tank against an excess of either pressure or vacuum.

Maintenance.—These venting devices bear Underwriter's approval but after installation should be properly maintained as to gaskets, grids, or screens, if they are to be effective. The aluminum grid or screen flame arrester should be kept clean of foreign material and requires special attention in freezing weather when hot oil is being pumped. Equipment should also be protected from mechanical damage which can be caused by careless handling.

Tank-Roof Openings

All tank-roof equipment should, when possible, be of vapor-tight design. Gage or thief openings should be provided with nonferrous seats.

Maintenance. — Regular inspection should be made of any tank openings provided in original design and defective equipment parts replaced to assure that the vents are kept vapor-tight. Inspections must be sufficiently thorough to assure the finding of any other vapor leaks in the tank. Especial attention should be given the roof-shell joint and roof proper to see that no leak is overlooked.

Floating-Roof Tanks

Tanks equipped with floating roofs control vapor loss, and through this factor serve to lessen the fire hazard. Openings in floating roofs also should be of vapor-tight design, with gage or thief openings provided with nonferrous seats.

Maintenance. — Regular inspections should be made to insure proper maintenance of roof openings and proper drainage of water. Special attention should be given the drainage system at the time of inspection to see that it is functioning properly. Periodic tests made around the periphery of the roof at the wall seal will indicate whether or not this seal is effective.

Repairs. — Necessary repairs should be made promptly at any point inspection indicates to be substandard. Only through such procedure can maximum benefit be derived from such installations.

Equipment for Fighting Tank Fires

The person in charge of normal operations should have a definite knowledge of teams, trucks, plows, slips, tractors, and bulldozers in the area which are available for his use in constructing necessary auxiliary dikes, fire walls, or deflecting channels in a fire emergency. In an emergency this equipment should be contracted for immediately in a sufficient quantity to guarantee control and insure that oil from a burning tank boilover will not have unrestricted flow and endanger adjacent tankage and other property.

While the building of auxiliary earthen dikes is speeded by use of mechanized units, it can be accomplished by properly equipped men, and to this end there should be provided at tank-farm-area headquarters a predetermined minimum of such equipment as plows, slips, long-handled shovels, picks, mattocks, proper sizes of line-pipe connections and pipe-line tools. There should be

Fig. 1—Modern central lease tank-battery installation on the Gulf Coast showing provisions made for fire protection. Lines from tops lead to relief valves at left. High fire wall surrounds battery

available sufficient pipe tongs, pipe wrenches, pipe and fittings to equip a connection crew to lay ¼ mile of 3-in. or 4-in. line and connect two pumps.

The Use of Steam

It was formerly a practice to inject steam under the roofs of tanks adjacent to the burning tank, but not only does the system of lines essential for this purpose introduce an additional risk but the use of steam in this manner is considered ineffective.

Steam, if available, may be employed when other extinguishing element is not available and when "vapors only" are burning at a leak of limited extent. If used, steam should be directed at right angle to the flow of escaping vapors, and at the base of the flame, in an attempt to cut off the flame by shock. When this is attempted, lines should be turnbuckled down.

Fig. 2—Portion of tank farm at a Gulf Coast refinery showing dispersement of tanks to prevent spread of fires. Tanks are adequately spaced and protected by individual fire walls

The Use of Foam

Several kinds of foam are utilized in fire-fighting, but for combating tank fires a foam produced by the chemical reaction between bicarbonate of soda, a foam-producing ingredient, and aluminum sulfate, is indicated. Bubbles of such foam contain carbon dioxide. This foam is considered the best development to date and the only one actually effective in bringing large oil surface fires under control to extinguishment.

Although the actual cost of extinguishment chemicals used on any particular fire is comparatively reasonable, a fixed installation of either the two-solution or dry powder type, with the appurtenances essential to proper delivery of foam to the oil surface in a tank is more expensive.

Foam, to be most effective, should be applied in accordance with the recommendation of the manufacturer and/or Underwriters' Laboratories. Difficulties of maintenance of proper solution precludes the two-solution system. Recommendations for a dry-powder foam-generating installation are roughly as follows:

There should be available for adequate protection a minimum of 4 lb. of powder per sq. in. of oil surface of the largest tank to be protected. Foam produced should be flowed gently onto the oil surface by an Underwriter's approved device. Example: An 80,000-bbl. tank, 117 ft. in diameter, has approximately 1,788 sq. ft. of oil surface and 22 tons of powder should be available for adequate protection. Since foam should be applied at the rate of ⅝ g.p.m. per sq. ft. of surface protected, for the tank mentioned an application rate of 8,091 g.p.m. of foam is indicated. One gallon of water with 1 lb. of foam powder creates 8 gal. of foam. Therefore, adequate protection of the 80,000-bbl. tank would require delivery of water at the rate of 1,012 g.p.m. and 100 lb. per sq. in. to generate the quantity and quality of foam required.

There are a limited number of such fixed foam installations on storage-tank farms probably because of the expense of the equipment necessary to insure adequate foam delivery, difficulties of obtaining a sufficient quantity of water, and the expense and space necessary for foam-powder storage.

Dumping Tanks

Where additional storage is available and natural terrain permits, or pumping facilities can be adapted to the need, it is common practice to gravitate or pump oil from a burning tank.

This operation requires care as there is danger that the heat from the oil being transferred will cause the lines to buckle. Oil should not be transferred after it has been heated to a higher degree than its flash point. When transferring oil from a burning tank it is advisable to lower the swing line of the receiving tank below the surface of the oil in that tank in order to cool the incoming oil as much as possible.

Boilover.—The boilover is considered the most hazardous condition incident to the fighting of a fire in large storage. It is usually a solid sheet of oil, possibly 1 to 2 ft. in depth, and will, if unretarded, often surmount the fire wall and run for a considerable distance outside. For this reason auxiliary dikes are recommended. Fires in crudes which contain even small quantities of basic sediment and water are subject to the boilover phenomena but will normally burn for a period of several hours (6 to 8) before it occurs.

Retarding the boilover.—If practical, during the waiting period, a ditch 18 in. by 20 to 24 in. deep should be dug at the inside toe of the fire wall to assist in retarding the flow resulting from the boilover. In normal tank fires, the downwind side of the tank is heated to a greater degree than the other portions, and it is ordinarily this side which buckles first, making a low point through which the boilover can surge. The possibility of greater hazard and damage on the downwind side should therefore be given consideration in the erection of auxiliary fire barriers or retaining walls outside the regular fire wall.

Ignition Sources

Lightning.—During certain seasons there is a grave danger of ignition from lightning. All-steel tanks of gastight construction are safest from this hazard, but these must be properly maintained if they are to remain safe. Grounding is usually inherent in tank installation since the tank usually rests on earth and is connected to grounded pipe lines. Where there is any question as to proper grounding, electrical-resistance tests should be made, and if resistance to the ground exceeds 25 ohms, special grounding connections should be installed.

Grass fires.—Grass fires are possibly the greatest other source from which ignition of vapors from a tank might occur. For this reason grass should not be permitted to grow in the space inside the fire wall, from the inside toe of the wall to the tank shell, and threatening grass fires should be quickly brought under control.

Possibly the most effective means of combating a grass fire where water in large quantities is not available is through the use of a reliable hand-pump type of extinguisher with knapsack tanks. The 5-gal. size is preferable for this purpose. This equipment utilizes small quantities of water to good advantage in a stream or spray, with slow, easy pumping. A man equipped with such an extinguisher can extinguish a grass fire practically as fast as he can walk along the face of the fire. Sand or earth, also, may be used effectively in controlling such fires.

Smoking.—Under no circumstances should smoking be permitted inside the fire wall. No matches but safety matches should be carried in or about the clothing of a person entering the area enclosed by the fire wall.

Housekeeping.—Combustible material of any kind should not be permitted to collect in the area enclosed by the fire wall, or to remain atop a tank. Rags, waste, lumber, etc., used for some specific purpose within the area should be removed immediately after having served their purpose.

Fire Procedure

Clearly established procedure should govern channels for handling the report in the event of a storage-tank fire. Line responsibility should be so defined that the person in charge at the scene of the fire may take any steps necessary to mobilize available equipment and manpower in sufficient quantities to cope with the situation. That person should remain in full charge until relieved of responsibility by a superior.

When a storage-tank fire occurs, it is advisable to immediately contact the sheriff's office or highway patrol, both if possible, to obtain assistance in keeping back sightseers and also to maintain a clear road for bringing in supplies and fire-fighting equipment.

Three major types of fire are recognized: a vapor fire in which no appreciable amount of

any other product is involved; a vapor and petroleum fire; and an oil-surface fire of major importance with vapors controllable by extinguishing the oil fire. These types are considered along with various circumstances that cause such fires.

Vapor Fires

Such a fire usually results where flammable vapors are discharged from an opening in the tank and there is ignition of these vapors from lightning, static or stray electricity, grass fires, smoking, contact of the vapor cloud with a burning incendiary bomb or torch, or from other sources. There are two possibilities to consider in a fire of this type:

1. Vapor mixture between roof and liquid stores, too rich to explode.

This condition can be expected when inpumping to a tank or when heat from an outside source raises the temperature of tank and contents causing outbreathing, and later, ignition of these vapors.

Characteristics.—Fire burning slowly at an open vent or other opening indicates that the mixture in the vapor space is too rich to explode. The flame is red to orange, smoky, and burns steadily without sputter, indicating a rich vapor-air mixture at the point of exit.

Precaution.—Ingress of air to tank through other openings or through steam, vapor, oil or other lines should be prevented. Outpumping from the tank should not be started.

Extinguishment.—Stop outbreathing or smother flames. As nonexplosive mixtures in tank can burn only when mixed with air, prevent vapor from leaving the tank and air from entering. Do not extinguish until tank is no longer exposed to ignition. A fire of this kind will ordinarily do very little damage, but after extinguishment the proportions of air and vapor may change and reignition may cause an explosion.

A vapor fire can be put out by smothering it with a wet woolen blanket or by use of Dugas or carbon dioxide extinguishers. It is inadvisable to turn a hose stream directly on the fire at a vent after the connections have become extremely hot as there is danger of cracking the connections and rendering them ineffective. If the fire is at a vent, the snuffer should be closed. If this does not completely shut off the flow of gas, a blanket may be used alone, or combined with other extinguishing methods suggested. The snuffer should be released immediately after the fire is out.

2. Explosive vapor mixture between roof and liquid storage.

The vapor mixture between roof and liquid storage may be explosive while outpumping from the tank or when there is sudden cooling such as might be caused by showers on an extremely hot day, thus causing inbreathing of the tank.

Characteristics.—The flame from an explosive mixture is bluish-green, fairly clear, relatively short, and burns with a vibrating or sputtering blowpipe action.

Precaution.—There is danger the flame will flash back into tank even through protected openings, if allowed to burn too long. For this reason fires of this type are dangerous and must be handled carefully to avoid personal injury and damage to the tank. There will usually be no flashback so long as the velocity of the outbreathing is greater than the rate of flame propagation into the vapor-air mixture in the tank. If the velocity is reduced, or the vapor-air mixture becomes more explosive, the flame may flash into the tank.

Extinguishment.—In a fire of this type, inpumping should be started or the rate of pumping accelerated for the purpose of creating a vapor-air mixture in the vapor space which is too rich to explode. If the fire is at a vent and the snuffing device can be operated, this should be attempted. Dugas or carbon dioxide extinguisher may be safely utilized if the fire is within effective range of such extinguisher. When available in sufficient quantities, carbon dioxide or other inert gas should be injected through openings to the vapor space for the purpose of making the vapor-air mixture nonexplosive. Care should be taken that no additional air is admitted.

Protected vents or openings.—A fire of either rich or explosive vapors at an opening in the tank or connections protected by approved fire-retardent grids or screens, does not constitute an extreme hazard. If instructions are followed a fire at such an opening can be extinguished without excessive risk to personnel.

Unprotected vents or openings.—Any vapor fire at an unprotected vent or opening is always dangerous and requires care in handling. When vapors are too rich to explode as recognized by flame characteristics, steps should be taken as directed for extinguishing fires at protected openings.

If vapors are explosive, as determined by flame characteristics, extreme caution should be exercised in choice of extinguishing methods. It is preferable, when possible, to begin to accelerate inpumping to the tank until flame characteristics show that the burning vapors have been enriched beyond the explosive point. The flame can then be handled as one at a protected vent. If this procedure is not possible the situation should be handled in accordance with instructions given below for extinguishing a vapor and oil fire.

Vapor and Oil Fires

This type of fire results when there is a rupture of some portion of the tank shell or roof, with ignition of the contents of the tank. Ignition could be caused by a "direct hit" by lightning, sabotage, aerial bombardment, or other ignition sources. Oil being discharged by flaming vapors form the primary risk.

Procedures.—(1) All precautions recommended for handling of vapor fires at unprotected vents or openings should be observed. (2) Water, foam, or other cooling materials should be applied to heated portions of the tank. (3) A fire stream may be used, if water is available at suitable pressure and in sufficient quantity, to sweep the fire away from the opening by cutting off the flame at its base. Fog nozzles may be used effectively for cooling purposes. (4) If conditions permit and the opening in the tank is of restricted extent, wet blankets or other similar wetted material may be used to cover openings at which there is fire. (5) If inpumping, this should be continued in cases where the break is restricted and the flame can be kept outside the tank shell or above the roof level. In this instance Dugas or carbon dioxide extinguishers may be used in an attempt to cut off the flame at its base. It is essential that metal in the immediate vicinity, however, be cooled below the flash point of the vapors to prevent reignition. (6) Blanket the oil surface with foam.

Oil Fire

Such a fire could result where there is extreme rupture of some portion of the tank and conse-

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Welder's Relation to the Saving of Metals

THE welder's part in the present program of conserving materials cannot be overemphasized.

A list of scarce raw materials will include each of those used in the manufacture of welding electrodes. Rubber is of course on the scarce list and extra precaution should be taken to eliminate abuse of the hose used by the welder if employing oxyacetylene welding.

Tips for the welder in carrying out a program of conservation include:

1. Keep gas cylinders moving. Don't permit them to lie idle; return empty cylinders promptly and see that they are not abused.

2. Turn off torches when they are not in actual use.

3. Use proper pressures and correct tip sizes for the job at hand. Excessive pressures and incorrect tip sizes are wasteful of materials.

4. Check hose connections regularly.

5. Keep tips clean at all times.

6. Close cylinder valves when gas is not being used.

7. Use all gas in each cylinder before connecting new one.

8. Use electrodes down until they are about 2 in. long, and acetylene rods down until they are too hot to hold. Most welders can improve their technique and frugality to the point of making three electrodes do the same work that they have been doing with four.

9. All small globules of bronze dropped in "brazing" operations should be saved and put in a suitable tin container. Many times they can be used on some other job.

10. Keep the inventory as low as possible.

11. Do not bend electrodes unless it is necessary to get at the job. If bending should be necessary, the bend should be as close to the holder as possible.

12. Electrode tips should be kept.

13. Keep electrodes in a dry place. A new box should never be opened until the old one is used up.

14. It is a good habit to take only the number of rods from the cabinet necessary to do the job at hand.

15. A change in welding technique will save electrodes. The flattening of the weld will not weaken it but will reduce electrode consumption, depending on the type weld considered, by from 20 to as much in some cases as 40 per cent. A checkup on the faulty conditions leading to excessive convexity of welds and remedying those conditions is worth considering.

16. The proper fitting of joints before the start of the welding operation takes place will conserve not only electrodes, but also time and power.

17. If the fillet weld is correctly made by the proper technique and the "legs" are kept equal, as much as 30 per cent reduction can be obtained in electrode consumption with no weakening of the weld.

18. The proper selection of the simplest joint that will meet the requirements of the job saves in three ways—time, labor, and materials.

Methods of Preparing Butadiene

This series of articles presents a complete summary of the sources of butadiene as revealed by the technical literature and by the research staff of Universal Oil Products Co. It contains a total of 38 tables of data. A list of the subjects covered was published on Page 41 of the November 5 issue of the Journal.

By GUSTAV EGLOFF and GEORGE HULLA
Universal Oil Products Co., Chicago, Ill.

(PART 5)

Table 14 is concerned with the catalytic dehydrogenation of butene-1 into butadiene-1,3. The yields of the latter can attain a value of 33-34 per cent by weight per pass. In some cases the output of butadiene reaches 80-91.6 per cent by weight on fully decomposed butene-1. A temperature of about 600° C. and the use of chromic oxide catalysts are typical reaction conditions.

TABLE 14—CATAYLTIC DEHYDROGENATION OF BUTENE-1

Composition of feed mixtures	Catalyst and apparatus used	Temp. (°C.)	Pressure (atm.)	Remarks (B is butadiene-1,3)	References
Butene-1 and carbon dioxide $C_4H_8 \rightarrow C_4H_6 + H_2$	A promoted Cr_2O_3 catalyst was used.			B yield was 33-34% by weight on absolute butene-1 and 80-90% by weight on butene-1 fully decomposed. This is a preliminary report.	A. A. Balandin, J. Phys. Chem. (U.S.S.R.) 14, 1,378-1,379 (1940); abstract in May 16, 1941, Universal Oil Products Co. Survey of Foreign Petroleum Literature.
Butene-1 and carbon dioxide $C_4H_8 \rightarrow C_4H_6 + H_2$	Quartz tube containing MgO as catalyst	650	1	B yield was 16.7% by weight on absolute butene-1 feed per pass and 41.2% by weight on butene-1 fully decomposed.	A. A. Balandin, N. D. Zelinskii, O. K. Bogdanova, and A. P. Shcheglova, J. Applied Chem. (U.S.S.R.) 14, 435-445 (1941); Translation 345 in Jan. 30, 1942, Universal Oil Products Co. Survey of Foreign Petroleum Literature; Foreign Petroleum Tech. 9, 265-282 (1941) also has a translation.
Butene-1 and carbon dioxide $C_4H_8 \rightarrow C_4H_6 + H_2$	Quartz tube containing $Al_2O_3 + V_2O_5$ as catalyst. Catalyst was prepared from Al_2O_3 and NH_4VO_3 solution.	500 550 600	1 1 1	B yields were 3.3, 8.7, 10.0% by weight on absolute butene-1 feed per pass at 500°, 550°, 600° C., respectively, and 74.6, 49.4, 52.1% by weight on butene-1 fully decomposed at 500°, 550°, 600° C., respectively.	Ibid.
Butene-1 and carbon dioxide $C_4H_8 \rightarrow C_4H_6 + H_2$	Quartz tube containing $Al_2O_3 + V_2O_5$ as catalyst. Catalyst was prepared by coprecipitation.	500 550 600	1 1 1	B yields were 7.4, 9.2, 19.2% by weight on absolute butene-1 feed per pass at 500°, 550°, 600° C., respectively, and 19.5, 29.7, 51.6% by weight on butene-1 fully decomposed at 500°, 550°, 600° C., respectively.	Ibid.
Butene-1 and carbon dioxide $C_4H_8 \rightarrow C_4H_6 + H_2$	Quartz tube containing Cr_2O_3 as catalyst.	500 550 600 650	1 1 1 1	B yields were 8.9, 14.4, 15.3, 20.4% by weight on absolute butene-1 feed per pass at 500°, 550°, 600°, 650° C., respectively, and 46.5, 62.7, 51.1, 44.3% by weight on butene-1 fully decomposed at 500°, 550°, 600°, 650° C., respectively.	Ibid.
Butene-1 and carbon dioxide $C_4H_8 \rightarrow C_4H_6 + H_2$	Quartz tube containing specially prepared Cr_2O_3 as catalyst	550 575 600 650	1 1 1 1	B yields were 20.1-23.6, 21.4-31.0-14.3, 19.5-26.1-30.1-33.0, 28.9% by weight on absolute butene-1 feed per pass at 550°, 575°, 600°, 650° C., respectively, and 77.6-91.6, 49-83-67, 64.7-50.6-76.9-74.2, 45.1% by weight on butene-1 fully decomposed at 550°, 575°, 600°, 650° C., respectively.	Ibid.
Butene-1 and carbon dioxide $C_4H_8 \rightarrow C_4H_6 + H_2$	Quartz tube containing Cr_2O_3 + kieselguhr as catalyst	500 550 600	1 1 1	B yields were 9.9, 15.2, 14.7% by weight on absolute butene-1 feed per pass at 500°, 550°, 600° C., respectively, and 33.8, 74.3, —% by weight on butene-1 fully decomposed at 500°, 550°, 600° C., respectively.	Ibid.
Butene-1 and carbon dioxide $C_4H_8 \rightarrow C_4H_6 + H_2$	Quartz tube containing $Cr_2O_3 + ZrO_2 + SiO_2$ catalyst	500 550 600	1 1 1	B yields were 15.3, 21.3, 21.0% by weight on absolute butene-1 feed per pass at 500°, 550°, 600° C., respectively, was 35.1, 47.2, 71.8% by weight on butene-1 fully decomposed at 500°, 550°, 600° C., respectively.	Ibid.
Butene-1 and carbon dioxide $C_4H_8 \rightarrow C_4H_6 + H_2$	Quartz tube containing Cr_2O_3 + ZnO as catalyst	500 550 600	1 1 1	B yields were 9.3, 20.7, 19.3% by weight on absolute butene-1 feed per pass at 500°, 550°, 600° C., respectively, and 30.9, 58.3, 67.4% by weight on butene-1 fully decomposed at 500°, 550°, 600° C., respectively.	Ibid.

(Continued on Next Page)

TABLE 14—CATALYTIC DEHYDROGENATION OF BUTENE-1 (Continued)

Composition and feed mixtures		Catalyst and apparatus used	(°C.) Temp.	(atm.) Pressure	Remarks (B is butadiene-1,3)	References
Butene-1 and carbon dioxide	$C_4H_8 \rightarrow C_4H_6 + H_2$	Quartz tube containing Cr_2O_3 + CuO as catalyst	500 550 600 650	1 1 1 1	B yields were 12.9, 15.1, 18.0, 20.8% by weight on absolute butene-1 feed per pass at 500°, 550°, 600°, 650° C., respectively, and 22.2, 57.3, 54.7, 42.9% by weight on butene-1 fully decomposed at 500°, 550°, 600°, 650° C., respectively.	A. A. Balandin, N. D. Zelinskii, O. K. Bogdanova, and A. P. Shcheglova, J. Applied Chem. (U.S.S.R.) 14, 435-445 (1941); Translation 345 in Jan. 30, 1942, Universal Oil Products Co. Survey of Foreign Petroleum Literature; Foreign Petroleum Tech. 9, 265-282 (1941) also has a translation.
Butene-1 and carbon dioxide	$C_4H_8 \rightarrow C_4H_6 + H_2$	Quartz tube containing Cr_2O_3 + MoO_3 as catalyst	450 500 550	1 1 1	B yields were 7.8, 12.9, 12.4% by weight on absolute butene-1 feed per pass at 450°, 500°, 550° C., respectively, and 33.8, 52.1, 54.9% by weight on butene-1 fully decomposed at 450°, 500°, 550° C., respectively.	Ibid.
Butene-1 and nitrogen	$C_4H_8 \rightarrow C_4H_6 + H_2$	Quartz tube containing specially prepared Cr_2O_3 as catalyst	550 575 600	1 1 1	B yields were 25.8, 27.4, 30.6% by weight on absolute butene-1 feed per pass at 550°, 575°, 600° C., respectively, and 86, 82, 80% by weight on butene-1 fully decomposed at 550°, 575°, 600° C., respectively. Also gave data for change of activity of catalyst with time at 575° C. (B yields).	Ibid.

Table 15 has data on the catalytic dehydrogenation of butene-2. In spite of contrary statements in the literature, the maximum yields of butadiene-1,3 from butene-2 are somewhat lower than those from butene-1, both on a single pass basis (30 per cent by weight) and for fully decomposed feed (70-78 per cent by weight).

TABLE 15—CATALYTIC DEHYDROGENATION OF BUTENE-2

Composition of feed		Catalyst and apparatus used	Temp. (°C.)	Pressure (atm.)	Remarks (B is butadiene-1,3)	References
Butene-2	$C_4H_8 \rightarrow C_4H_6 + H_2$	Glass tube containing Cu as catalyst	600	0.987	B yield was 7.9% by weight on butene-2 feed per pass and 19.0% by weight on butene-2 fully decomposed	B. P. Fedorov, A. I. Smirnova, and P. A. Semenov, J. Applied Chem. (U.S.S.R.) 7, 1166-1180 (1934); Translation S-150A in Jan. 30, 1942, Universal Oil Products Co. Survey of Foreign Petroleum Literature
Butene-2	$C_4H_8 \rightarrow C_4H_6 + H_2$	Porcelain tube containing MgO as catalyst	700	0.1	B yield was 12.0-26.0% by weight on butene-2 feed per pass and 31.0-40.0% by weight on butene-2 fully decomposed. Detailed data for 3 feed rates are given	Ibid.
Butene-2	$C_4H_8 \rightarrow C_4H_6 + H_2$	Porcelain tube containing ZnO as catalyst	700	0.1	B yields, depending on feed rate, were 15.4-18.0% by weight on butene-2 feed per pass and 31.0-28.0% by weight on butene-2 fully decomposed, respectively. Data for 600° C. conditions were given also	Ibid.
Butene-2	$C_4H_8 \rightarrow C_4H_6 + H_2$	Quartz tube containing MgO as catalyst	700 Product rapidly cooled to 335°	0.1	B yield was 5.7% by weight on butene-2 feed per pass and 45.0% by weight on butene-2 fully decomposed	Ibid.
Butene-2	$C_4H_8 \rightarrow C_4H_6 + H_2$	Quartz tube containing Cr_2O_3 as catalyst	600	0.974	B yield was 7.2% by weight on butene-2 feed per pass and 30.0% by weight on butene-2 fully decomposed. Also gave data for 500° and 700° C. conditions	Ibid.
Butene-2	$C_4H_8 \rightarrow C_4H_6 + H_2$	Quartz tube containing Cr_2O_3 as catalyst	520	0.1	B yields, depending on feed rate, were 7.1-17.0% by weight on butene-2 feed per pass and 55.0-27.1% by weight on butene-2 fully decomposed, respectively	Ibid.
Butene-2	$C_4H_8 \rightarrow C_4H_6 + H_2$	Copper, quartz, or porcelain tubes. Catalysts were MgO; Cu wire; reduced Cu; lustrous carbon; carbon on unglazed porcelain; Lebedev's catalyst; Glukhov clay; Glukhov clay with 1% of $NaNO_3$; and pumice stone	500-760		B yields were up to 22.0% on feed per pass and 78% on feed with recycling	A. I. Yakubchik, Trudy Gosudarst, Opyt, Zavoda Sintet. Kauchuka Litera B, IV, Synthetic Rubber, 1935, pp. 60-67; Chem. Abs. 31, 7035 (1937)
Butene-2	$C_4H_8 \rightarrow C_4H_6 + H_2$	Feed diluents when used were nitrogen and steam	650	Vacuo in absence of diluents	B yields were up to 30% by weight on absolute butene-2	O. K. Bogdanova, unpublished work, 1936-38, mentioned by A. A. Balandin, N. D. Zelinskii, O. K. Bogdanova, and A. P. Shcheglova, J. Applied Chem. (U.S.S.R.) 14, 435-45 (1941); Translation 345 in Jan. 30, 1942, Universal Oil Products Co. Survey of Foreign Petroleum Literature

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TABLE 15—CATALYTIC DEHYDROGENATION OF BUTENE-2 (Continued)

Composition of feed		Catalyst and apparatus used	Temp. (°C.)	Pressure (atm.)	Remarks (B is butadiene-1,3)	References
Butene-2 and nitrogen	$C_4H_8 \rightarrow C_4H_6 + H_2$	Quartz tube containing Cr_2O_3 as catalyst	500	1	B yield was 20.8% by weight on absolute butene-2 feed per pass and 49.2% by weight on butene-2 fully decomposed. Also gave data for 400°, 450°, 550°, and 600° C. conditions	B. P. Fedorov, A. I. Smirnova, and P. A. Semenov, J. Applied Chem. (U.S.S.R.) 7, 1166-1180 (1934); Translation S-150A in Jan. 30, 1942, Universal Oil Products Co. Survey of Foreign Petroleum Literature
Butene-2 and nitrogen	$C_4H_8 \rightarrow C_4H_6 + H_2$	Quartz tube containing SiO_2 gel as catalyst	500 600	1 1	B yield at 500° C. was 6.85% by weight on absolute butene-2 feed per pass and 14.7% by weight on butene-2 fully decomposed. B yield at 600° C. was 11.9% by weight on absolute butene-2 feed per pass and 16.4% by weight on butene-2 fully decomposed	Ibid.
Butene-2 and nitrogen	$C_4H_8 \rightarrow C_4H_6 + H_2$	Porcelain tube containing MgO as catalyst	700	1.035	B yield was 29.5% by weight on absolute butene-2 feed per pass and 54.8% by weight on butene-2 fully decomposed. Also gave data for 0.975 atm. pressure conditions	Ibid.
Butene-2 and steam	$C_4H_8 \rightarrow C_4H_6 + H_2$	Steel tube with Cu + Mn liner. Catalyst was ZnO (72.7%), $CaCrO_4$ (9.09%), plus Al_2O_3 (18.2%)	600	1?	B yield was about 19.3% by weight on absolute butene-2 per pass and above 70% by weight on fully decomposed butene-2	O. Grosskinsky, N. Roh, and G. Hoffman (assignors to Jasco, Inc.), U. S. Patent 2,265,641 of Dec. 9, 1941 [This patent is now vested in L. T. Crowley, Alien Property Custodian, Federal Register 7, No. 62, 2417-2424 (1942)]; British Patent 524,918 of Aug. 19, 1940 (to I.G. Farbenindustrie A.-G.)
Butene-2 and steam	$C_4H_8 \rightarrow C_4H_6 + H_2$	Steel tube with Cu + Mn liner. Catalyst was ZnO (65.3%), Al_2O_3 (21.8%), CaO (10.9%), plus Cr_2O_3 (2%)	Not stated	1?	B yield was "good"	Ibid.
Butene-2 and steam	$C_4H_8 \rightarrow C_4H_6 + H_2$	Steel tube with Cu + Mn liner. Catalyst was ZnO (98.5%) plus MoO_3 (1.5%)	550-600	1?	B yield was 14.5-19.3% by weight on absolute butene-2 per pass and "very satisfactory" on fully decomposed butene-2	Ibid.
Butene-2 and steam	$C_4H_8 \rightarrow C_4H_6 + H_2$	Steel tube with Cu + Mn liner. Catalyst was ZnO (65%), calcium aluminate (30%), plus V_2O_5 (5%)	600	1?	B yield was about 19.3% by weight on absolute butene-2 per pass and over 67.5% by weight on fully decomposed butene-2	Ibid.
Butene-2 and steam	$C_4H_8 \rightarrow C_4H_6 + H_2$	Steel tube with Cu + Mn liner. Catalyst was ZnO (95%) plus Cr_2O_3 (5%)	640-660	1?	B yield was 23.0% by weight on absolute butene-2 per pass and over 72.3% by weight on fully decomposed butene-2.	Ibid.
Butene-2 and steam	$C_4H_8 \rightarrow C_4H_6 + H_2$	Catalyst was calcium aluminate (15%) plus zinc aluminate (85%)	600		B yield was "good" on fully decomposed butene-2	I.G. Farbenindustrie A.-G., German Patent 533,778 of May 7, 1931; Friedlaender's Fortsch. der Teerfarbenfabrikation 18, 754-56 (1933).
Butene-2 and steam	$C_4H_8 \rightarrow C_4H_6 + H_2$	Tube with Cu + Mn liner. Catalyst was lustrous carbon deposited on MgO	740	1	B yield = ? Unconverted butene-2 can be recycled	I.G. Farbenindustrie A.-G. (O. Schmidt, M. Treppenhauer, O. Grosskinsky, and H. Fischer, inventors), German Patent 565,159 of Nov. 29. 1927

Table 16 applies to catalytic dehydrogenation of butene-1 and butene-2 mixtures. The maximum yields of butadiene reported are about 20 per cent by weight per pass, corresponding to around 50 per cent by weight on fully decomposed *n*-butenes. A lower conversion per pass (11.5 per cent by weight yield) resulted, in one case, in an increased yield (76.2 per cent of butadiene by weight on fully decomposed feed). The catalytic dehydrogenation of *n*-butenes has the characteristics of a chemical equilibrium: the theoretical percentage of butadiene (96.4 per cent) cannot be approached without intermediary fractionation and recycling.

TABLE 16—CATALYTIC DEHYDROGENATION OF *n*-BUTENES

Composition of feed		Catalyst and apparatus used	Temp. (°C.)	Pressure (atm.)	Remarks (B is butadiene-1,3)	References
n-Butenes	$C_4H_8 \rightarrow C_4H_6 + H_2$	Cu was the catalyst	Dull or moderate red heat		B yield = ?	W. H. Perkins and F. E. Matthews British Patent 17,235 of July 24, 1912.
n-Butenes	$C_4H_8 \rightarrow C_4H_6 + H_2$	MgO was the catalyst	700-720		B yield was 19.3% by weight on feed per pass and 48% by weight on fully decomposed feed.	I. G. Farbenindustrie A.-G., German Patent 544,290 of April 2, 1931; Friedlaender's Fortschritte der Teerfarbenfabrikation 18, 752-753 (1933).
n-Butenes	$C_4H_8 \rightarrow C_4H_6 + H_2$	Cr_2O_3 was the catalyst	404-534	0.132	B yields for equilibrium state were 10.5 and 20.6% by weight on feed at 480° and 534° C., respectively.	M. I. Dementjeva, A. V. Frost, and E. K. Serebrinkova, Compt. rend. acad. sci. U.R.S.S. 15, 141-143 (1937).
n-Butenes	$C_4H_8 \rightarrow C_4H_6 + H_2$	$Al_2O_3 + Ti_2O_3 + TiO_2$; Al_2O_3 + 5% of ZrO_2; and $Al_2O_3 + ThO_2$ were the catalysts used.	600 (1st and 2nd catalyst 610 (3rd catalyst)	0.25 (all 3 catalysts	B yields were 19, 18, and 17% by weight on feed per pass over 1st, 2nd, and 3rd catalysts, respectively.	Universal Oil Products Co., British Patent 483,184 of April 13, 1938.

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TABLE 16—CATALYTIC DEHYDROGENATION OF *n*-BUTENES (Continued)

Composition of feed		Catalyst and apparatus used	Temp. (°C.)	Pressure (atm.)	Remarks (B is butadiene-1,3)	References
n-Butenes	$C_4H_8 \rightarrow C_4H_6 + H_2$	CrO_3 on Al_2O_3 was the initial catalyst.	600	0.25	B yield was 20% by weight on feed.	A. V. Grosse, (assignor to Universal Oil Products Co.), U. S. Patent 2,178,584 of Nov. 7, 1939.
n-Butenes	$C_4H_8 \rightarrow C_4H_6 + H_2$	(W_2O_3 + WO_3) on Al_2O_3 was the catalyst	610	0.25	B yield was 19% by weight on feed.	Ibid.
n-Butenes	$C_4H_8 \rightarrow C_4H_6 + H_2$	ZrO_3 on MgO was the catalyst.	600	0.25	B yield was 18% by weight on feed.	J. C. Morrell (assignor to Universal Oil Products Co.), U. S. Patent 2,178,601 of Nov. 7, 1939.
n-Butenes	$C_4H_8 \rightarrow C_4H_6 + H_2$	Ti_2O_3 on Al_2O_3 was the catalyst.	600	0.25	B yield was 19% by weight on feed.	Ibid.
n-Butenes	$C_4H_8 \rightarrow C_4H_6 + H_2$	ThO_2 on Al_2O_3 was the catalyst.	610	0.25	B yield was 17% by weight on feed.	Ibid.
n-Butenes	$C_4H_8 \rightarrow C_4H_6 + H_2$	(V_2O_3 + V_2O_4) on Al_2O_3 was the catalyst.	600	0.25	B yield was 19% by weight on feed.	J. C. Morrell and A. V. Grosse (assignors to Universal Oil Products Co.), U. S. Patent 2,178,602 of Nov. 7, 1939.
n-Butenes	$C_4H_8 \rightarrow C_4H_6 + H_2$	TaO_3 on Al_2O_3 (96% by weight) was catalyst.	605	0.25	B yield was 19% by weight on feed.	Ibid.
n-Butenes	$C_4H_8 \rightarrow C_4H_6 + H_2$	Cr_2O_3 (4%) + Al_2O_3 (96% by weight) was the catalyst.	600	0.25	B yield was 18-20.6% by weight on feed per pass and 36-50% by weight on fully decomposed feed. Data also given for 15 other conditions (600°-650° C. and 0.0829-0.2605 atmosphere pressure), e.g., B yield was 11.5% by weight on feed per pass and 76.2% by weight on fully decomposed feed at 650° C., 0.221 atmosphere pressure and 0.018 second contact time.	A. V. Grosse, J. C. Morrell, and J. M. Mavity, Ind. Eng. Chem. 32, 309-311 (1940); Rubber Chem. Tech. 13, 533-538 (1940).
n-Butenes	$C_4H_8 \rightarrow C_4H_6 + H_2$	Al_2O_3 + SiO_2 + SnO_2 was the catalyst.	Heated		B yield = ?	J. C. Morrell and A. V. Grosse, U. S. Patent 2,212,034 of Aug. 20, 1940.
n-Butenes	$C_4H_8 \rightarrow C_4H_6 + H_2$	Vycor tube containing catalyst whose composition was not disclosed.	604	Below 1	B yield was 19.8% by weight on feed per pass.	V. I. Komarewsky and C. H. Reisz, The Oil and Gas Journal, 41, No. 19, pp. 33, 37, 39 (1942).
			600	Below 1	B yield was 16.6% by weight on feed per pass.	
			654	Below 1	B yield was 14.9% by weight on feed per pass.	
n-Butenes and nitrogen	$C_4H_8 \rightarrow C_4H_6 + H_2$	CaO was the catalyst.	700		B yield = ?	I. G. Farbenindustrie A.-G., German Patent 544,290 of April 2, 1931; Friedlaender's Fortschritte der Teerfarbenfabrikation 18, 752-753 (1933).
n-Butenes and steam	$C_4H_8 \rightarrow C_4H_6 + H_2$	Graphite was the catalyst.	730		B yield = ?	I. G. Farbenindustrie A.-G., German Patent 533,778 of May 7, 1931; Friedlaender's Fortschritte der Teerfarbenfabrikation 18, 754-756 (1933).
n-Butenes and steam	$C_4H_8 \rightarrow C_4H_6 + H_2$	Steel tube with Cu + Mn liner. Catalyst was ZnO (90%) + Cr_2O_3 (10%).	580	1 (?)	B yield was over 19.3% by weight on absolute hydrocarbon feed per pass.	O. Grosskinsky, N. Roh, and G. Hoffman (assignors to Jasco, Inc.), U. S. Patent 2,265,641 of Dec. 9, 1941. [This patent is now vested in L. T. Crowley, Alien Property Custodian; Federal Register 7, No. 62, 2,417-2,424 (1924)]; British Patent 524,918 of Aug. 19, 1940 (to I. G. Farbenindustrie A.-G.).
n-Butenes and steam	$C_4H_8 \rightarrow C_4H_6 + H_2$	Steel tube with Cu + Mi liner. Catalyst was ZnO (65%), calcium aluminate (30%), plus WO_3 (5%).	580-600	1 (?)	Exit gas had 15% of B.	O. Grosskinsky, N. Roh, and G. Hoffman (assignors to Jasco, Inc.), U. S. Patent 2,265,641 of Dec. 9, 1941. [This patent is now vested in L. T. Crowley, Alien Property Custodian; Federal Register 7, No. 62, 2,417-2,424 (1942)]; British Patent 524,918 of Aug. 19, 1940 (to I. G. Farbenindustrie A.-G.).
n-Butenes and steam	$C_4H_8 \rightarrow C_4H_6 + H_2$	Steel tube with Cu + Mn liner. Catalyst was ZnO (95%) plus ammonium uranyl acetate (5%).	550-600	1 (?)	B yield was "good."	Ibid.
n-Butenes and methylbutenes obtained by dehydration of unfractionated fusel oil $C_4H_8 \rightarrow C_4H_6 + H_2$ $C_5H_{10} \rightarrow C_5H_8 + H_2$		Finely divided Pt was the catalyst.	Heated	1	Both B and 2-methylbutadiene-1,3 were formed.	O. Nauck, German Patent 264,902 of Dec. 19, 1912; Friedlaender's Fortschritte der Teerfarbenfabrikation 11, 798-800 (1915).

Table 17 covers dehydrogenation on *n*-butane and *n*-butenes in presence of chlorine and/or hydrogen chloride with or without oxygen as reactants. In some cases, catalysts or heat-conducting materials are utilized. *n*-Butane yielded 26-34 per cent of butadiene by weight when dehydrogenated directly by chlorine and 12 per cent when converted indirectly by hydrogen chloride plus oxygen in the presence of a cuprous chloride + chormic chloride + alumina catalyst. *n*-Butenes respond better to direct dehydrogenation by chlorine to butadiene than *n*-butane: the yields approach 72 per cent by weight.

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TABLE 17—DEHYDROGENATION OF *n*-BUTANE AND *n*-BUTENES IN PRESENCE OF CHLORINE AND/OR HYDROGEN CHLORIDE WITH OR WITHOUT OXYGEN

Composition and reaction mixtures	Catalyst and apparatus used	Temp. (°C.)	Pressure (atm.)	Remarks (B is butadiene-1,3)	References
n-Butane and chlorine $C_4H_{10}+2Cl_2\rightarrow C_4H_6+4HCl$	Narrow bulb tube for mixing the feed gases. The mixture was blown through a quartz tube 2 mm. wide against a frontal plate heated externally to bright red heat and arranged in a quartz tube 15 mm. wide. Cooling chamber. Lye containers remove HCl.	Bright red heat	1 (?)	B yield was 34% by weight on absolute butane feed. Acid solution of cuprous chloride was used to separate B and butene.	H. Baehr and W. Deiters (assignors to Jasco, Inc.), U. S. Patent 2,259,195 of Oct. 14, 1941. [This patent is now vested in L. T. Crowley, Alien Property Custodian; Federal Register 7, No. 62, 2,417-2,424 (1942)] I. G. Farbenindustrie A.-G., French Patent 837,411 of Feb. 9, 1939.
n-Butane and chlorine $C_4H_{10}+2Cl_2\rightarrow C_4H_6+4HCl$	Catalyst was active Al_2O_3 with 20% of cuprous chloride.	350	1 (?)	B yield was 26% by weight on absolute butane feed. Similar results were claimed for catalysts comprised of active carbon (alone or else with $AlCl_3$, $NiCl_2$, $MnCl_2$, $MgCl_2$, $ZnCl_2$, $SnCl_2$, $PbCl_2$, $BiCl_3$, $BaCl_2$, $CdCl_2$, or BiOCl) or of $SiCl_4$ on silica gel.	Ibid.
n-Butane and chlorine $C_4H_{10}+2Cl_2\rightarrow C_4H_6+4HCl$	Nozzle-shaped burner for mixing the feed gases. Tubular spiral for preheating the chlorine. Reactor was a tube filled with lumps of coke. Quench vessel wherein H_2O removes HCl.	600	1 (?)	B yield was 34% by weight on absolute butane feed per pass. Can recycle butene, chlorobutanes, and chlorobutenes to increase total yield of B.	Ibid.
n-Butane, chlorobutanes, and chlorine $C_4H_{10}+2Cl_2\rightarrow C_4H_6+4HCl$ $C_4H_9Cl+Cl_2\rightarrow C_4H_6+3HCl$	Narrow bulb tube for mixing the chlorine and chlorobutane + butane vapors. The mixture was led through a quartz tube 6 mm. in internal width and blown against a frontal wall heated to bright red heat by direct heating with a chlorine-detonating gas flame which is situated in a quartz tube of 42 mm. internal width. Quench vessel wherein dichlorobutane is used. Lye containers to remove HCl.	Bright red heat	1 (?)	B yield was 40% by weight on absolute butane feed or else 31% by weight on *n*-butane plus chlorobutanes.	Ibid.
n-Butane, *n*-butenes, and chlorine $C_4H_{10}+2Cl_2\rightarrow C_4H_6+4HCl$ $C_4H_8+Cl_2\rightarrow C_4H_6+2HCl$	Catalyst was active carbon arranged between two concentric stoneware tubes. The gases are mixed within the inner or porous tube. Quench vessel wherein H_2O was used. Lye was used to remove HCl.	550	1 (?)	B yield was 63% by weight on *n*-butane plus *n*-butenes.	Ibid.
n-Butenes and chlorine $C_4H_8+Cl_2\rightarrow C_4H_6+2HCl$	Mixing nozzle for *n*-butene and chlorine. Reaction tube of silicon carbide and filled with silicon carbide pieces.	Weak red heat	1 (?)	B yield was 48% (by weight?) on absolute *n*-butene feed, calculating to 57.5% (by weight?) on fully decomposed *n*-butene.	Ibid.
n-Butenes and chlorine $C_4H_8+Cl_2\rightarrow C_4H_6+2HCl$	Two concentric tubes of chamotte, of which the inner compartment is the preheater whereas the outer tube is the reactor. Water sprayer for the hot exit gases.	650-700	1 (?)	B yield was 72% by weight on absolute *n*-butene feed per pass.	Ibid.
n-Butane, hydrogen chloride, oxygen and steam $C_4H_{10}+4HCl+O_2\rightarrow C_4H_6+4HCl+2H_2O$ Note that $4HCl+O_2$ is equivalent to $2Cl_2$	Al_2O_3 impregnated with Cu_2Cl_2 + $CrCl_3$ was the catalyst.	320	1 (?)	B yield was 12% by weight on absolute *n*-butane per pass, corresponding to 20% by weight on fully decomposed *n*-butane.	I. G. Farbenindustrie A.-G., French Patent of Addition 49,633 of May 16, 1939.
n-Butenes, chlorine, and hydrogen chloride $C_4H_8+Cl_2\rightarrow C_4H_6+2HCl$	Cast steel tube with inside pipe for feeding the chlorine.	650	1 (?)	B yield was 59.8% by weight on absolute *n*-butane feed.	A. Cantzler and H. Krekeler (assignors to Jasco, Inc.), U. S. Patent 2,274,358 of Feb. 24, 1942. This patent is now vested in L. T. Crowley, Alien Property Custodian; Federal Register 7, No. 62, 2,417-2,424 (1942).
n-Butenes and hydrogen chloride $C_4H_8\xrightarrow{HCl}C_4H_6+H_2$	Cast steel tube.	625	1 (?)	B yield was 34.4% by weight on absolute *n*-butene feed.	Ibid.

Table 18 contains data on the partial oxidation of hydrocarbons present individually, or collectively as naphtha or crude petroleum. Except for butene and "petroleum naphtha," which yield respectively 15.8 and over 5 per cent of butadiene-1,3 by weight on the hydrocarbons, the various feeds and partial oxidations are qualitative in nature. It may be remarked, however, that partial oxidation is not an irrational procedure. The hypothetical intermediary products, namely, alcohols, aldehydes, carboxylic acids, and phenols, are known to be substances capable of direct conversion into butadiene-1,3. Later tables will develop this part of the study.

TABLE 18—PARTIAL OXIDATION OF HYDROCARBONS

Composition of feed	Apparatus and catalysts used	Temp. (°C.)	Pressure (atm.)	Remarks (B is butadiene-1,3)	Rferences
n-Butane and air or oxygen Probably $C_4H_{10}+O_2\rightarrow C_4H_6+2H_2O$	Tubes or checkerbrick chamber. Air was fed at successive intervals along the tubes.	410	About 1	B production was left to the reader's inference.	M. B. Hopkins (assignor to Standard Oil Development Co.), U. S. Patent 1,808,168 of June 2, 1931.

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TABLE 18—PARTIAL OXIDATION OF HYDROCARBONS (Continued)

Composition of feed	Apparatus and catalysts used	Temp. (°C.)	Pressure (atm.)	Remarks (B is butadiene-1,3)	Rferences
Hydrocarbon gases and vapors which condense with difficulty, containing especially saturated hydrocarbons of low molecular weight up to pentane which are obtained in the destructive hydrogenation of carbonaceous materials such as coals of any kind, tars, mineral oils, and the like. Probably $C_nH_{2n}+O_2 \rightarrow C_4H_6+2H_2O$	Manganese dioxide, manganese sulfide, vanadium oxide, molybdenum oxide, chromium oxide, aluminum oxide, active carbon, active silica, elements and compounds of groups 1 and 2 of the Periodic System, e.g., carbonates of the alkali and alkaline earth metals, and the like, either singly or in admixture with each other are suitable catalysts.	500-850	1 or above	The products are acetic acid and its homologues, ketones, aldehydes, alcohols, and the like, and valuable unsaturated hydrocarbons such as B, butene, propene, and the like. The gas containing or supplying oxygen to the feed may consist, for example, of carbon dioxide, steam, or air. Better yields of products are secured with carbon dioxide than with steam when alumina is the catalyst. B was not mentioned in the three examples of the patent.	I.G. Farbenindustrie A.-G., British Patent 305,803 of Oct. 6, 1927.
Ethene $2C_2H_4+\frac{1}{2}O_2 \rightarrow C_4H_6+H_2O$	Porous porcelain covered with precipitated Fe_2O_3 was used at 712° C. Porous porcelain saturated with $FeCl_3$ was used at 714° C.	712 714	1 1	B yields = ? Recycling is possible. Can add air or oxygen to the ethene if desired. The Fe_2O_3 and $FeCl_3$ are typical oxidizing agents and could give H_2O and HCl, respectively, when reduced by ethene.	W. H. Perkin and F. E. Matthews, British Patent 15,049 of June 25, 1914.
Butene-2 and air $C_4H_8+\frac{1}{2}O_2 \rightarrow C_4H_6+H_2O$	Porcelain tube containing Cu as catalyst	700	1	B yield was 15.8% by weight on absolute butene-2 feed per pass.	B. P. Federov, A. I. Smirnova, and P. A. Semenov, J. Applied Chem. (U.S.S.R.) 7, 1166-1180 (1934); Translation S-150A in Jan. 30, 1942, Universal Oil Products Co. Survey of Foreign Petroleum Literature.
Cyclohexane, carbon dioxide and air $C_6H_{12}+3\frac{1}{2}O_2 \rightarrow C_4H_6+2CO_2+3H_2O$	Carbon dioxide was used to vaporize the cyclohexane	?	1	B yield = ?	Farbenfabriken vorm. Friedr. Bayer and Co., German Patent 278,647 of June 11, 1914; Friedlaender's Fortschritte der Teerfarbenfabrikation 12, 564-65 (1917).
Cyclohexene, carbon dioxide, and air $C_6H_{10}+3O_2 \rightarrow C_4H_6+2CO_2+2H_2O$	Carbon dioxide was used to vaporize the cyclohexene.	?	1	B yield = ?	Ibid.
Benzene, nitrogen, and air $C_6H_6+2O_2 \rightarrow C_4H_6+2CO_2$	Nitrogen was used to vaporize the benzene. The vapors were kept ignited by a hydrogen pilot flame.	?	1	B yield = ?	Ibid.
Toluene, nitrogen, and air $C_7H_8+3\frac{1}{2}O_2 \rightarrow C_4H_6+3CO_2+H_2O$	Nitrogen was used to vaporize the toluene. The vapors were kept ignited by a hydrogen pilot flame.	?	1	B yield = ?	Ibid.
Naphthalene, carbon dioxide, and air $C_{10}H_8+6\frac{1}{2}O_2 \rightarrow C_4H_6+6CO_2+H_2O$	Carbon dioxide was used to vaporize the naphthalene. A pilot flame was used. Burner tube was heated to prevent condensation of naphthalene.	?	1	B yield = ?	Ibid.
Petroleum naphtha, steam, and air	The naphtha and steam were preheated to 593° C. A refractory-lined reactor received the superheated steam, preheated naphtha, and air. Direct-contact water spray, direct-contact cooling tower, compressor, absorber, "fat oil" stripper, debutanizer, stabilizer, and a butadiene extraction system were used also.	760	1.68	B yields were over 5% by weight on absolute naphtha feed.	National Petroleum News 34, No. 31, 14-38 (1942).
Naphtha (60°-100° C. boiling range), nitrogen and air $C_6H_{14}+4O_2 \rightarrow C_4H_6+2CO_2+4H_2O$ $C_5H_{10}+5\frac{1}{2}O_2 \rightarrow C_4H_6+3CO_2+5H_2O$	Nitrogen was used to vaporize the naphtha. The vapors were ignited by an illuminating gas pilot flame.	?	1	B yield = ?	Farbenfabriken vorm. Friedr. Bayer and Co., German Patent 278,647 of June 11, 1914; Friedlaender's Fortschritte der Teerfarbenfabrikation 12, 564-65 (1917).
Crude petroleum (or tar oils) and air	Not described but similar to usual equipment.	?	1	B yield = ?	Ibid.

Policies and Results of Kansas Water Flooding

(Continued from Page 32)

tion is mixed with brine pumped from this sand. By discharging brines from both sources down an open flume, provision is made for thoroughly aerating as well as mixing the two brines.

In the completion of input wells 5½-in. casing has been used which was cemented with 25 sacks of 24-hour cement. Shooting has been done with 1 qt. of solidified nitroglycerin per foot of sand in the part of the sand body where the sand is clean. Water is turned directly into the casing without any pressure at the surface except the hydrostatic head in the lines from the filter plant. Meters for all lines are located at the plant.

At the beginning of flooding, wells took as much as 1,000 bbl. per day. After the first month or two input decreased to 500 to 700 bbl. per day and further declined as more wells were added. It is reported that it took 10 months for the first input well to effect an increase in production. But 6 years later operation of new input wells brought an increase in production within 10 days. Last year the oil-water ratio was improved to a marked extent. For several years before that it took 8 bbl. of water to produce 1 bbl. of oil. Following the operation of the property with a change in supervision and provision for steady production by utilizing brine from a reliable source, it was possible to reduce the 1 to 8 oil-water ratio to 1 to 7.

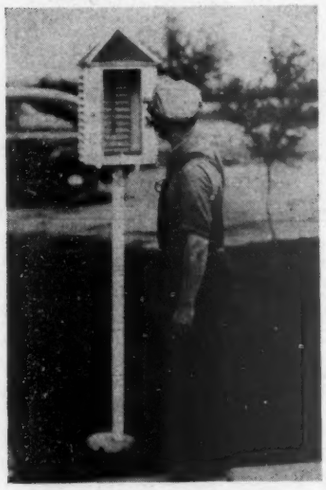
Although flooding was sometimes discontinued for periods as long as 6 months between 1935 and 1940, there is no evidence that the property was damaged by stopping input when droughts came. Within 1 or 2 months after water input was resumed, production was back to normal.

Experience has shown that the old wells functioned as satisfactorily as producers as new wells might be expected to do. There has been an absence of the coating of paraffin frequently found on the sand face in other areas. The original wells were thoroughly cleaned when they were drilled in a regular square pattern well suited to later water-flood needs. The drilling of the five-spot in the center completed the pattern.

As a result of the low drilling cost, wide spacing and absence of facilities for injecting water under pressure the property is in a position to compete on a favorable basis with properties operated to flood sands at shallow depths with close well spacing.

Pipe-Line Suggestions

Thermometer Protection at Compressor Station



Because of unsatisfactory results obtained with thermometers recording atmospheric temperature, the chief engineer of a major natural-gas pipeline company had special housing made for holding them. This provides for having the thermometer hung at a distance from the building where it will be exposed to normal atmospheric circulation. At each station, he has had installed what are called "bird houses," supported on pipe and equipped with louvre sides. The thermometer may be examined by opening a door which is closed by a spring. There is room enough inside to hold a flashlight which it is sometimes convenient to keep there.

Container for Tank Seals Installed at Property

A pipe-line gager, employed by a system serving western Kansas, has installed a container for holding tank seals and wiping cloths

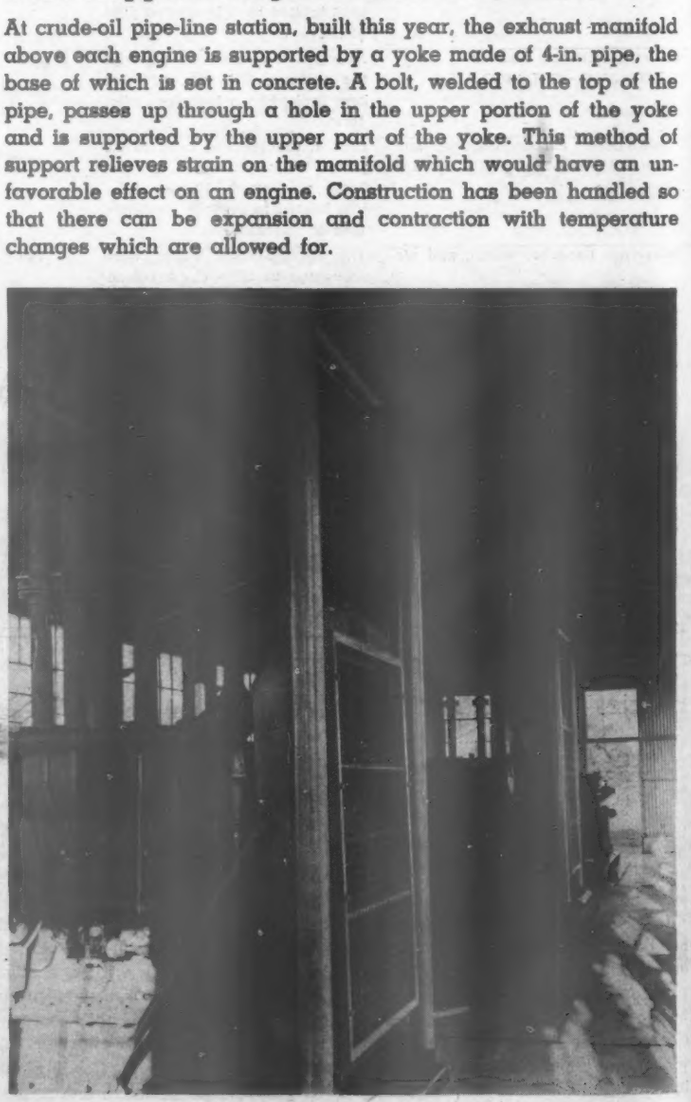
which he uses in his work. This is placed just outside the fence surrounding the property. The main container, itself, is made of 12-in. pipe, supported on 4-in. pipe. Adjacent to the main container, there is a smaller container of 6-in. pipe.

Raised Platform for Pump Equipment

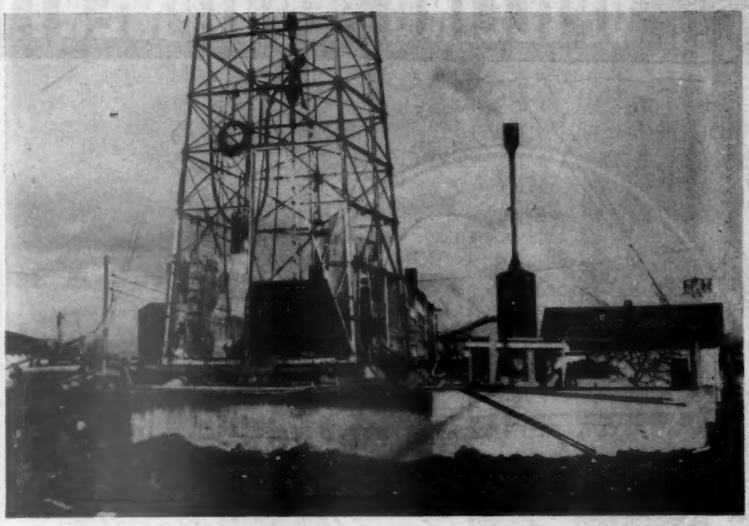
At a location which is subject to inundation during flood time, it was found necessary to build a platform so that the gathering pump would be above high-water level. This platform has been built so that it will withstand the force of the current and the floating debris as well as to provide ready access for men in charge of operating equipment. Difficulties with platforms for this purpose have been encountered when equipment is moved. These were overcome by constructing skids which may be seen at the right.

Yoke Supports Engine Exhaust Manifold

At crude-oil pipe-line station, built this year, the exhaust manifold above each engine is supported by a yoke made of 4-in. pipe, the base of which is set in concrete. A bolt, welded to the top of the pipe, passes up through a hole in the upper portion of the yoke and is supported by the upper part of the yoke. This method of support relieves strain on the manifold which would have an unfavorable effect on an engine. Construction has been handled so that there can be expansion and contraction with temperature changes which are allowed for.



Operating Ideas

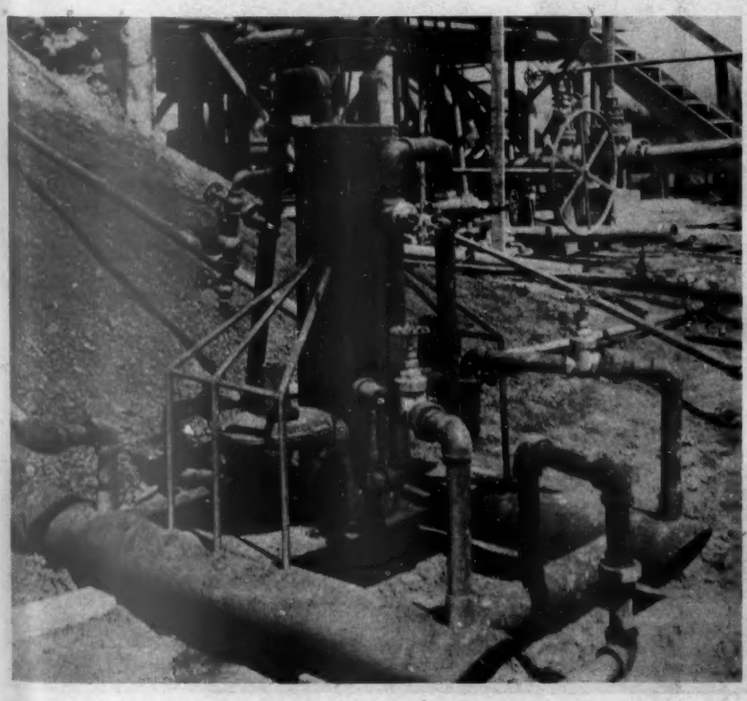


Cement Mud Pits for Townsite Drilling

Providing adequate but compact mud pits in the usually close quarters of townsite drilling has always been a problem. Steel mud tanks have been used in many cases but with the war scarcity of metals steel tanks and pits cannot be obtained readily. An Oklahoma drilling contractor has resorted to concrete mud pits in such instances. The pits are constructed to serve as retainer walls when the well is completed.

Unitized Feed Control for Gas Engines

On a gas-engine-powered mechanical rotary rig operated by a major operator in the Apache, Oklahoma, field, the two engines are fed from a single volume-tank and feed-control unit. The single volume tank is equipped with two feed regulators, one for each engine, so that the volume of feed to each engine can be controlled separately. In the picture note the guards that have been provided over each regulator to protect them from damage in handling the unit.



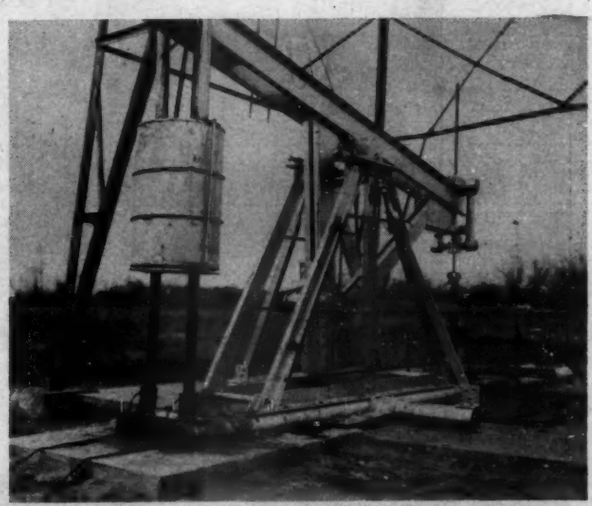
Foot Throttle for Servicing Machine

An operator of a well-servicing machine in the Oklahoma City, Oklahoma, field, has devised a foot throttle for controlling the speed of the gasoline engine. This frees both hands of the operator for manipulation of the

rod and tubing hoisting controls. The foot throttle is operated by a cable extension to the conventional hand throttle. It is suspended through a small pulley to a convenient foot-control position.

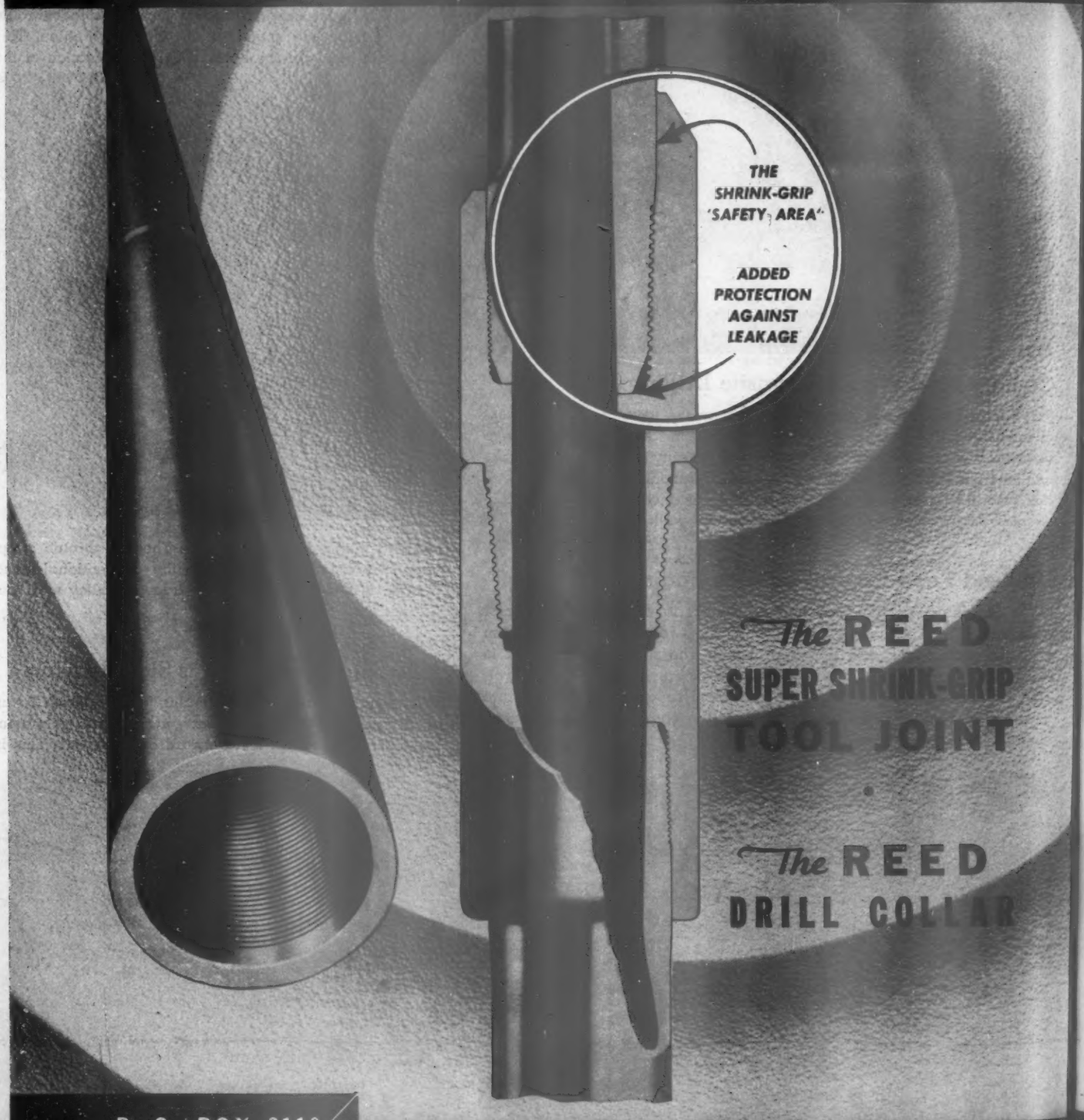
Jack Extension Prevents Side Rocking

To eliminate rocking of his pumping jacks, a North Texas operator equips the base of each jack with a crossmember extending several feet outward on each side. This is



made from a section of old 6-in. casing welded to the frame of the jack base. With the side extensions bolted to the concrete floor of the well, a solid foundation is provided for the jack. Observe also the counterbalance, consisting of an old oil drum filled with weighting material and operating on two pipe guides.

How to Lengthen the Life of Your DRILLING EQUIPMENT



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A *Good* ANY TIME,

A few suggestions that will give you the *"EXTRA LIFE"* that is built into

REED TOOL JOINTS and DRILL COLLARS

CARE OF TOOL JOINTS

USE YOUR THREAD PROTECTORS

Leave thread protectors on tool joints until pipe is put into use.

CLEANING and *DOPING*

Clean joints thoroughly, removing all grease and dirt.

Before screwing together, dope threads thoroughly with a good grade zinc base lubricant.

Steam or wash out inside of new pipe before running in the hole to assure removal of all shavings, mill scale and foreign matter, which may damage threads.

STABBING and *TONGING*

Joints should be tonged up tightly before running in the hole, and under no circumstances should the torque applied to the string in drilling be depended upon to tighten the joints or keep them tight.

CAREFUL INSPECTION

Inspect shoulders and threads before running in the hole each time and keep threads well doped.

Replace thread protectors when pipe is moved to new location.

CARE OF DRILL COLLARS

The suggestions concerning the use of thread protectors, cleaning and doping, tonging, etc., may be followed in the care and maintenance of Drill Collars.

The maintenance of alignment is also of paramount importance and cannot be stressed too highly, as the resultant whip of a mis-aligned drilling string is both dangerous and costly.

MAINTENANCE OF ALIGNMENT

Support the drill collar throughout its entire length when it is placed upon the pipe rack.

Exercise extreme care while handling to protect the shoulders and threads.

When lifting the drill collar use a wrap in the middle and at both ends to protect alignment.

Bulletin T-1041 on the care and maintenance of Reed Tool Joints will be sent upon request.

Various instruction sheets are also available on the care and operation of the Reed "Kor-King" and Reed "BR" Core Drills, and on the correct selection of Jet Sizes for Rock Bits.

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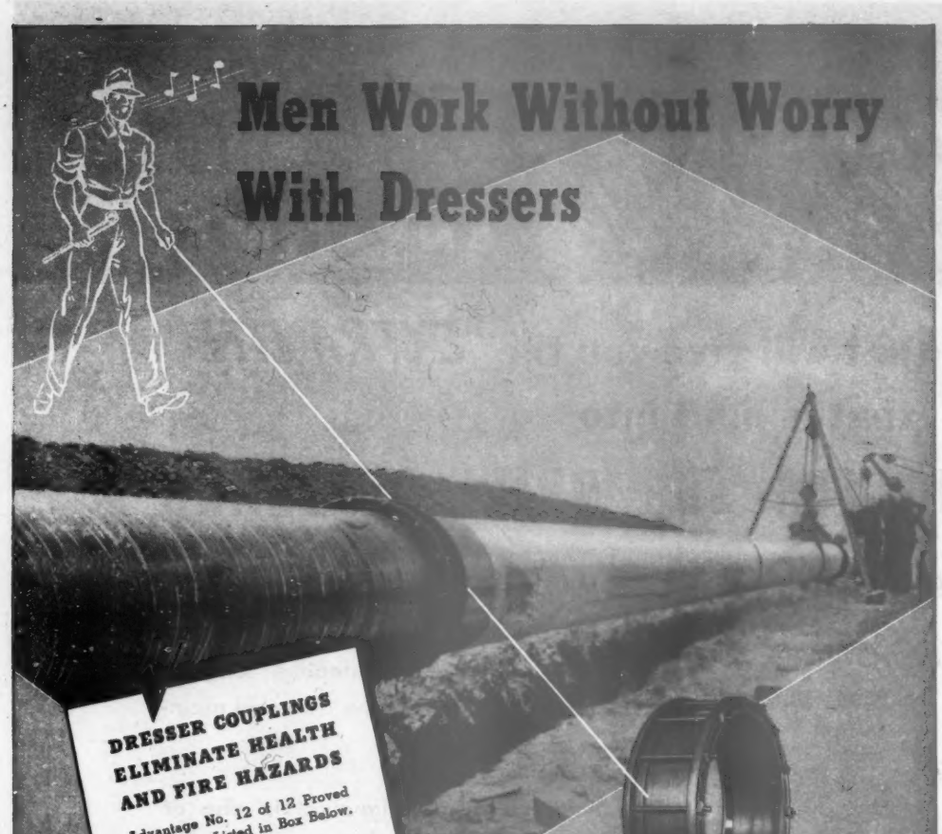

In tackling the health and fire hazard problem of pipe-line construction and repair, you can, of course, plan to take elaborate precautions to safeguard men and materials—hoping that these precautions will be rigidly observed at all times. But you can also make your plans so that there will be no hazards for your men to face.

You'll readily appreciate the advantages of the second method, for here is where Dresser Couplings enter the picture. Dressers give you an entirely *mechanical* means of joining pipe, with a wrench the only tool required, and so assure the highest possible degree of safety under all conditions. Dressers on your line safeguard such work as line repairs, making new connections on old lines, dismantling lines, removing and reconnecting sections of line, and laying new lines in danger zones.

Remember this important advantage of Dressers. Specify Dresser Couplings for your next line!

Check THESE 12 PROVED ADVANTAGES THAT ONLY DRESSERS GIVE YOU

1. Dresser Couplings eliminate all uncertainty in joint-making.
2. Dresser Couplings permit use of local, untrained labor.
3. Dresser Couplings provide the only time-proved method of absorbing expansion and contraction.
4. Dresser Couplings give greater speed.
5. Dresser Couplings simplify both pipe and joint specifications.
6. Dresser Couplings can be installed regardless of weather, wind, or rain conditions.
7. Dresser Couplings eliminate "fussy" operations.
8. Dresser Couplings permit pipe deflection for curves and grades with straight pipe.
9. Dresser Couplings reduce cost of supervision and inspection.
10. Dresser Couplings cut maintenance costs.
11. Dresser Couplings are fool-proof, strong, *permanently* tight.
12. ✓ Dresser Couplings eliminate health and fire hazards.

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Proper Boiler Maintenance For Maximum Service

PROPER boiler maintenance not only will give the plant operator a longer service but by achieving a properly maintained boiler plant he may also benefit from additional efficiency in steaming power and increased horsepower output.

The three first essentials to efficient boiler operation are properly conditioned feed water, proper combustion, and last but not least, a clean boiler.

A properly conditioned boiler feed water can be obtained by any plant although they do not have available in their organization an expert in that line. All that is necessary is to have the representative of a reputable company specializing in boiler feed-water problems come to your plant and talk your situation over. He will take samples from various places in your "water routings" and have them analyzed before he makes recommendations as to how your problem can best be met.

Proper combustion results from the proper location of your burners in relation to the firebox and the combustion area available, the proper control of draft, and the efficient control of the actual firing medium used to develop the required boiler horsepower.

Recommended Procedure

The average boiler battery is subjected to more abuse as the usual thing than it is to proper care. The following suggestions are advanced to eliminate abuse:

1. Gages should be tested, try cocks, water columns, safety valves and gage glasses should be inspected and tested frequently to determine if they are clear and in good working order.

2. Keep all minor leaks caulked, but let only a "boilermaker" make major repairs.

3. Consult your boiler inspector regarding major repairs. He may not only have an idea that will save you money, but his advice may save your boiler.

4. Wash all soot and other foreign matter out of the tubes each time the boiler is down for cleaning.

5. Issue proper low-water level instructions and see that they are closely followed.

6. Take sufficient time to bring a boiler up to line pressure so that no excessive strains will be developed.

7. Check and retighten handhole and manhole-plate bolts after the boiler has come up to a small pressure.

8. Before firing, check water level and all valves to see that they are in the proper position.

9. Open an air vent or try cock to expell air until steam comes.

10. Pull the safety valve before the boiler reaches line pressure to see if it is functioning.

11. Blow boiler down regularly to aid in keeping boiler clean. The manual blow-down should be used at least once each tour. In the case of water-tube boilers firing under heavy overloads excessive blowing down may cause short-circuit in water circulation through the tubes. The quick-opening valve should be closer to the boiler than the other valve and it should be opened last.

12. When cutting the boiler into the line, be sure that it has reached the main-line pressure and open the header valve slowly.

13. Do not blow a boiler down while it is still under steam pressure when it has been taken off the line for cleaning.

14. Do not rapidly cool the boiler down by opening draft, firebox, or smokebox doors.

15. Always clear the combustion chamber of gases before firing up or before entering the

(Continued on Page 56)

QUESTIONS ON TECHNOLOGY

By W. L. NELSON, Technical Editor

Heat of Reaction in Diisobutylene Plant

In the design of a diisobutylene plant for the butyl-rubber program, is it necessary to remove heat during the reaction? How much is this heat?—P. A. B.

The heat required or generated by a reaction can be computed with fair accuracy by determining the algebraic sum of the heats of combustion (or formation) of the materials entering and leaving the reaction. This is illustrated for the reactions involved in cracking on Page 298 of the 2nd Edition of Petroleum Refinery Engineering (McGraw-Hill Book Co., 330 West Forty-second Street, New York). The method is theoretically sound but it requires great care in its application because differences in large numbers are involved in the computation, and thus small errors in the heat of combustion data will introduce relatively large errors. It is wise, for this reason, to make several computations using different sources of combustion data so that the possible magnitude of the error can be evaluated.

In classwork at University of Tulsa, a number of polymerization reactions such as that involved in producing diisobutylene from isobutylene have been investigated by computations. For any polymerization of two olefin molecules (say 2 butylene) to produce one new olefin molecule (say octylene-1), the heat of reaction (exothermic) is about 40,000 B.t.u. per lb. mol of product. Similarly for the formation of a trimer the heat of reaction would be 80,000 B.t.u. per lb. mol of product and for a tetramer (4 molecules combine into one) 120,000 B.t.u. per lb. mol of product. The relation is not perfect being somewhat as follows:

For ethylene polymerization	44,800
For propylene	35,600
For butylene	38,600
For isobutylene polymerizing to: 2,4,4-trimethyl pentene-1	55,800
For isobutylene polymerizing to: 2,4,4-trimethyl pentene-2	50,800

Undoubtedly one of the technical committees of the Petroleum Industry War Council has considered this problem.

Isobutane—Manufacture And Stabilization

I would like some information on the manufacture and stabilization of isobutane. Do you have literature or reprints of papers on this subject?—C. E. C.

The absorption of isobutane is conducted along with the absorption of normal butane in all natural-gasoline plants. It is not absorbed as completely as the normal butane because its vapor-pressure is higher than that of normal butane (73.7 for isobutane at 100° F., 52.2 for butane), but it is absorbed much more completely than propane (vapor pressure of propane is 187). Thus, in plants which produce sizeable amounts of propane (about one-fifth as much propane as natural gasoline) the isobutane is almost completely recovered. As an average, the isobutane content of natural gases is 30 to 56 per cent of the normal butane content (The Oil and Gas Journal, Jan. 8, 1942, Page 38).

After having absorbed the isobutane, it is lost in some degree in the stripping still and stabilizer, but not to a large degree if the plant is operated for the recovery of propane. If propane is not recovered as a separate product, the isobutane will be lost to some extent in the stripper and in the stabilizer tail gas, and the operation of these equipments must be modified by maintaining lower gas separator (or top) temperatures.

If a mixed-butane product is being manufactured, this stock must be fractionated in a tower containing 40 or more fractionating trays and operating with a reflux ratio exceeding 8. If neither propane nor mixed butanes are being produced, a new high-pressure stabilizer operating as a depropanizer should be installed and the old stabilizer (low pressure) can be operated as an isobutane (deisobutanizer) separator. The residue from such an operation would be natural gasoline, which contains only those hydrocarbons that are heavier than isobutane. Such a gasoline would be somewhat similar to regular natural gasoline, except that it might fall in a lower vapor-pressure classification, i.e. a 26-70 grade might drop to an 18-55 grade, or 18-55 grade to a 14-40 grade.

Should separation of several hydrocarbons in the pure state be advisable, such as the production of propane and butane for bottle gas, isobutane for butyl rubber or alkylates, butane for butadiene, and isopentane for 100-octane gasoline, one tower (or stabilizer) will be required for each pure product that is produced. In spite of continued attempts, no designer has yet been able to accomplish a creditable job of separation without the use of one tower for each product. A tower system for the separation of propane, a rich isobutane stock, and isopentane is shown by Turner and Rubey in Refiner & Natural Gasoline Manufacturer of September 1938 or in Petroleum Refinery Engineering, 2nd Edition, Page 367, McGraw-Hill Book Co., 330 West Forty-second Street, New York, 1941. The general operations are discussed in these references and also in The Oil and Gas Journal, Jan. 8, 1942; Harts, The Oil and Gas Journal, April 24, 1941; Wilson, The Oil and Gas Journal, May 14, 1942, p. 66; Rifenberick, Petroleum Engineering Annual No. 1942, p. 150; and Stockman, The Oil and Gas Journal, August 15, 1940, p. 50, but these pertain only to processing because details of operation can only be determined by design computations.

The flow diagram indicated on this page shows the general type of operation that may be followed. The products are removed one by one in the order of their boiling points, with each tower operating at a decreasing pressure, but high enough to permit condensation of reflux at the temperature of such cooling water as is available. Thus, the depropanizer would operate at somewhat under 200 lb. per sq. in., the deisobutanizer at under 100 lb. per sq. in., the debutanizer at under 60 lb. per sq. in., etc. A relatively large amount of reflux (8 or more) is required for each of the fractionators and the number of plates required increases with the boiling point of the product. Thus, 30 plates may suffice for propane but 50 plates may be required for isopentane or pentane (contaminated with any 2,2-dimethyl hexane that is present), and more than 70 plates may be required in separating each one of the 16 common hydrocarbons boiling between 130° and 200° F., or up to normal heptane.

Data on Isobutane

We would appreciate it greatly if you would send us some information concerning the production and facts with regard to isobutane. Also, we would appreciate it if you would include some data with regard to isomerization.—J. F. M.

The common physical properties of isobutane (or 2 methyl propane) as taken from Doss, Physical Properties of the Principal Hydrocarbons, 3rd Ed., compiled by the technical and research division of Texas Co., are as follows:

Molecular weight		58.08	
Specific gravity (referred to air)		2.0042	20°/4°
Specific gravity, liquid		0.5665	15.5/15.5
Melting point, °C.	minus	160.9	(or —257.6° F.)
Boiling point, °C.	minus	10.2	(or 13.6° F.)
Index of refraction		1.3514	(at —25° C.)
Viscosity, gas		0.0000744	(at 20° C.)
Viscosity, gas		0.0000792	(at 40° C.)
Viscosity, gas		0.0000845	(at 60° C.)
Specific heat		0.462	(at 15° C.)
Heat of vaporization (cal./gm.)		84.0	(or 151.2 B.t.u./lb.)
Heat of combustion (K-cal./mol)		686.3	(or 21,250 B.t.u./lb.)
Heat of expansion per °C.		0.002304	(10° to 37.7° C.)
Critical pressure, lb./sq. in.		543	
Critical temperature, °C.		133.7	(or 276° F.)
Surface tension		14.10	(at 0° C.)
Octane number, motor method		99.0	

The equilibrium constants of isobutane are given on Page 234 of the 2nd Ed. of Petroleum Refinery Engineering, by Nelson, McGraw-Hill Book Co., Inc., 330 West Forty-second Street, New York, 1941; or in the current issue of the Natural Gasoline Supply Men's Association bulletin on technical material, Kennedy Building, Tulsa.

Below are listed somewhat recent items on the Questions on Technology Page of The Oil and Gas Journal, or in feature articles:

(1) Viscosity—Page 50, July 13, 1939; (2) Cost of Manufacture—Page 58, Nov. 7, 1940; (3) Pure for Laboratory Tests—Page 57, Mar. 13, 1941; (5) Use for 100-Octane Fuels—Page 63, Dec. 25, 1941; (6) Ratio to Butane—Page 38, Jan. 8, 1942; (6) Separation From Butane—Pages 38, 39, Jan. 8, 1942; also Pet. Ref. Eng., Page 367; (7) Amount Available—Page 10, Jan. 22, 1942, along with item (5) above; (8) Use for Synthetic Rubber—Page 199, Jan. 29, 1942; (9) Isomerization—Page 85 and Page 120, Mar. 26, 1942; (10) Alkylation—Page 56, June 4, 1942; (11) General Usefulness—Page 165 (mainly 169), June 25, 1942; (12) Shortage—Page 53, Sept. 10, 1942.

TIMESAVER ON SUBCHASERS

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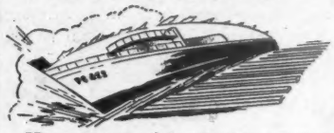

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It's just plain common sense that machinery with moving parts requires more maintenance checks than a machine without moving parts. So this boat builder bought only "maintenance free" Westinghouse A.C. Welders for his metal joining work.

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Methods of Combating Fires In Oil-Storage Tanks

(Continued from Page 35)

quent drainage of oil into the area defined by the fire wall, with ignition of the entire oil surface. This could be caused by a direct hit by lightning, sabotage, aerial bombardment, or other possible sources of ignition.

This type of fire may include vapor, and vapor and oil fires where damage to tank shell or bottom is of such extent as to discharge the bulk of oil into the fire wall.

Procedures.—(1) Outpumping should be started. (2) Auxiliary fire walls, deflecting walls or channels should be repaired, utilizing natural drainage and basis, if any; if none, such protective features should immediately be built, giving primary attention to the side downwind from the fire. A boilover, if any, will often extend further in that direction. A check should be made to assure that vents on adjacent tanks are in working condition with flame arrestors in proper condition and place. The protection of adjacent storage is of vital importance. (3) If possible, the first should be blanketed with foam as this is the only means of positive control and extinguishment.

Summary.—Fires such as these are extremely hazardous and no set of rules or instructions could cover every circumstance which might arise. These fires require analysis as fighting progress and advantage should be taken of any natural circumstance or special equipment that may give a solution to the problem.

The fact that there is no set procedure for these disastrous fires makes their prevention doubly necessary.

Proper Boiler Maintenance For Maximum Service

(Continued from Page 52)

boiler or combustion chamber to make repairs.

16. Do not pump water into a "low level" boiler until it has cooled sufficiently to permit the placing of the bare hand on the fire sheets. And do not fire the boiler until after the water level has been brought back to its normal condition.

17. Wash boiler regularly, check fusible plugs each time boiler is washed, and change plugs periodically.

18. Boiler feed and blow-off connections should be checked regularly to determine if they are clear.

19. An internal inspection should be made of a boiler at least once each year and external inspections should be made at least semiannually.

20. Heating of feed water will reduce local strains in the boiler, removal of oil will reduce tendencies to "blister" and "burn," and routine cleaning of burner tips and jets will give more efficient combustion.

21. Not only will scale films cause lowering of over-all efficiency, but it can in many cases cause failure of boiler tubes and sheets.

22. Priming, foaming, and carry-over should be avoided. Minimum trouble from this source may be attained by treating the feed water, controlling the water level, continuous blow-down, and auxiliary manual blow-down.

23. Before a boiler is entered, all valves should be closed and locked, or proper danger signs placed. It is a good rule to disconnect the fuel line and blank it off.

24. Safety promotes maximum service. Proper placement of and care of tools, parts, and fittings promote safety as does the routine inspection of equipment.

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GARLOCK

Modern Technique in Oil-Well Cementing

By P. E. HILTON
Baker Oil Tools, Inc.*

Through the development of certain techniques in oil-well cementing operations, important savings of time, money and materials, vital to our current war effort, are being effected. In this paper the author discusses the new tools and methods dealing with various well cementing, repair, and completion operations and problems, including:

1. Placing of a cement plug of some specified length below the casing and cementing the casing in a single operation.

2. Running and cementing of blank liners in one operation.

3. Cementing liner with perforations below and blank above.

4. Cementing of liner off bottom.

5. Multiple-stage cementing of liner or casing.

UNDER certain conditions when a productive sand has been drilled through before setting the water string, it is necessary to provide a cement plug of some specified length before the casing is cemented. New technique makes it possible to do this efficiently and effectively in a single operation. In this a tail pipe, made of drillable metal, is run in on the bottom of the float or guide shoe. A float shoe with or without side ports may be used. When a float shoe without side ports is used all the cement is discharged through ports in the bottom of the tail pipe. In the case of a float shoe having side ports, the cement is discharged simultaneously through the shoe and the bottom of the tail pipe. After cement sets, the shoe is drilled out with the cement plug to a short distance below the shoe for a water shut-off test, the remainder of the plug sealing off the productive zone during the procedure. With a satisfactory cement job assured the rest of the plug and tail pipe are drilled out. It is considered good practice to run a casing scraper between the bit and drill collar to remove the sheath of cement left by the bit on the casing wall. A clean wall assures positive grip for slips and a smooth surface against which the packing member of testers and similar devices can seal, and prevents cementing tools, which normally are run with close clearances, from hanging up.

The procedure of running and cementing a blank liner in one operation involves the use of a float shoe having side ports and left-hand square threads (positioned in an upper extension of the valve cage), a square, left-hand threaded sub which screws into the left-hand threads in the shoe, and a circulation or expansion joint, made up on the bottom of the running-in string, which may be either tubing or drill pipe. Cementing of the liner, which is run in on the bottom of the string, is performed in the usual manner, after which the running-in string is lowered a few inches, which telescopes the circulation joint and takes the strain off the sub. The running-in string then is turned to the right, which disconnects the left-hand threads, and raised several feet so that any excess cement which may have come over the top of the liner can be backscuttled. It then can be removed from the hole, leaving the liner cemented in place with the inside clean and ready for gun perforating.

When cementing a liner with perforations below and blank above, the liner is made up as above except that a bull plug is run on the bottom, and a float collar having side ports and a solid baffle below the ball valve, and a basket are made up in a position immediately above the perforated section. The solid baffle prevents the cement from going down the inside of the perforated section, and the basket keeps the cement from gravitating down the outside. A slidably mounted basket is considered preferable for this as the liner can travel upward at least 3 ft. before it lifts the basket and the column of fluid.

To cement liner off bottom, the string is made up the same as previously described for cementing blank liner on bottom except that a circulating type sub is used. This sub contains a number of fluid ports, which, while running in, are covered by a sliding sleeve. After the desired amount of cement has been put away through the running-in string and shoe, a bridging ball is dropped in the cementing string on top the cement column. The ball seats in the sub so that

(Continued on Page 65)

*An extended digest of a paper delivered before the San Joaquin Valley Chapter of A.P.I.

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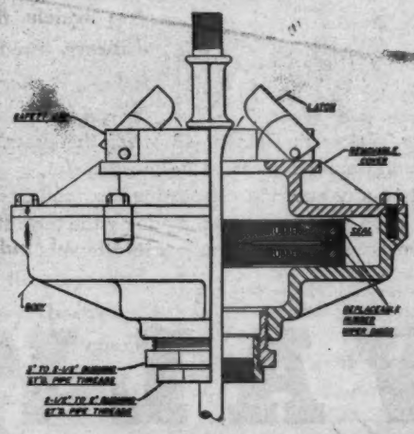

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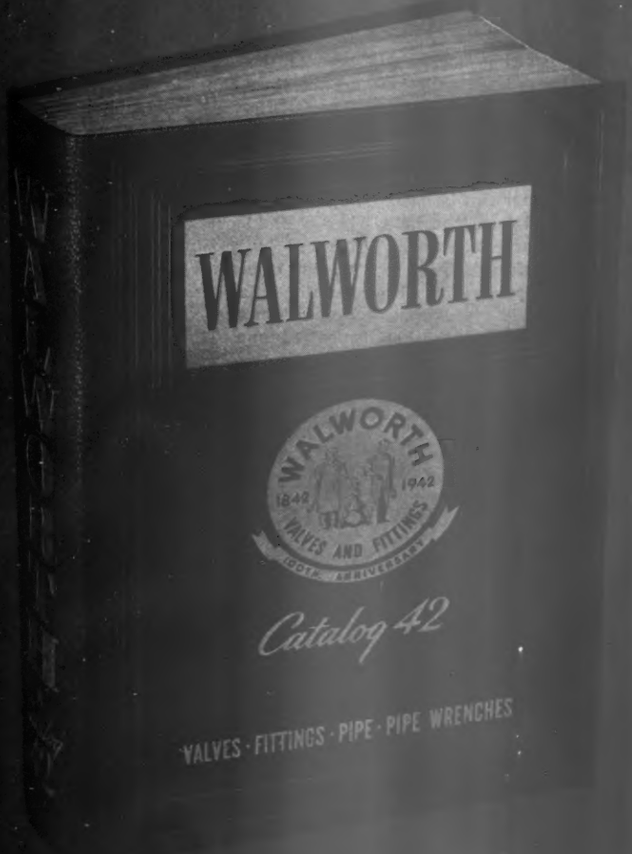

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A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

DRILLING

DECEMBER 3, 1942

DRILLING ON LAND CONTRASTED WITH BARGE DRILLING IN SEMIMARSH FIELD

IN "Cost Engineering" in the November 26 issue of The Oil and Gas Journal, the economies effected by drilling barges as against the costs involved in the use of piling foundations for drilling equipment in the development of water-bed and marsh-located fields along the Gulf Coast were analyzed. It was shown that not only are important savings made in the actual physical cost of the foundations themselves but also that major financial benefits are derived from the time saved by barges in well moves due to the elimination of the need for dismantling and reassembling of the drilling rig for each well.

The discussion in this case concerned entirely development in fields in which there is no alternative but to employ drilling barges or provide piling structures for foundations. There are, however, a number of fields on the Gulf Coast in which development can be carried on either by land or maritime methods. In such instances the choice between the two hinges on which of the two methods can be carried on with the lowest cost. Here the advantages of barge drilling are placed up for scrutiny with other types of development than piling.

The contrast between maritime and land operations are being brought strikingly together in several coastal Louisiana fields where some operators are developing their properties by the land route and on immediately adjoining leases others have chosen to cut canals and use drilling barges.

Many factors combine to make this choice a difficult one and much time must be spent on preliminary surveying. The proximity of roads and the corresponding distance over which roads must be built is important. The cost of these roads, based upon the amount of fill required, is another. On the other hand, the dragging of a system of canals from main waterways to the lease and throughout the property demands careful surveying and cost analysis.

The matter of choice between employment of drilling barges and land-type development comes up particularly in semimarsh fields located accessible to good roads and at the same time convenient to navigable waterways. These fields may be inundated or marshy during certain periods yet fairly dry in other seasons. The soil is dry enough that, considering the accessibility of the field to dry land and roads, it would be possible either to throw up a road system through the field or build plank roadways that would be adequate for trucking. At the same time it might be possible to dredge a system of canals through the area permitting the use of drilling barges.

Canal Cuts Costs

In one such Louisiana field in which the choice was made to use drilling barges instead of undertake a land development substantial savings in time and costs of well moves, transportation, hauling, and other handling costs have been realized.

The field is about 5 to 6 miles from the Intracoastal Canal, and the Bel City drainage canal, also a navigable waterway, which flows into the Intracoastal Canal, passes immediately adjacent to the east side of the field, providing access by water route.

Unlike the waterways in water and marsh fields, which either are natural or which can be dredged, the canal system in this field has been dry cut. In undertaking the cutting of these canals, the cost has been found to be substantially less than would have been required to build roads, and also has been less than the usual cost of dredging in marshes. Even the laying of temporary plank roadways to the various locations would have involved a greater initial outlay than required by the cutting of the canals. Thus to start development of the properties, important savings have been effected.

On the other hand, providing this system of canals is a sizable project. The canals are being cut approximately 60 ft. wide and 9 ft. deep from the surface (water depth about 7 ft.), which requires the removal of more than 105,600 cu. yd. of dirt per mile.

Draglines have been used in excavating the canals. These are operated from the banks, using mats in soggy places. Mats are picked up and carried ahead with the dragline. Excavated dirt has been piled on both sides of the canals, forming high levees which serve to prevent any overflow of the canals on the surrounding rice land during high water. With all operations within the canal system protected by the levees there is no chance of pollution escaping. Special traps, or gates, also have been provided that permit drainage of the surrounding country into the canal system, but prevent any back flow.

The canal system is being laid out in straight lines across the company's properties, following the rows of well locations being drilled on a uniform 40-acre unit well-spacing pattern. The main canal enters the field from the Bel City drainage canal, about 1½ miles east of the center of development.

Accessibility of the field to the Intracoastal Canal makes it possible to bring pipe and other equipment direct to the field and wells by barges from eastern mills and plants or from other supply centers. Particularly in the case of pipe, which can be unloaded at the well in which it is to be used, substantial savings have been effected in handling. By this practice as much as $1,000 has been saved in pipe-handling costs on a single well.

The canal system also is facilitating the movement of oil production direct from the field by barges.

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Journalog

DECEMBER 3, 1942 — No. 21

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W½ NE SW 25-17s-4w

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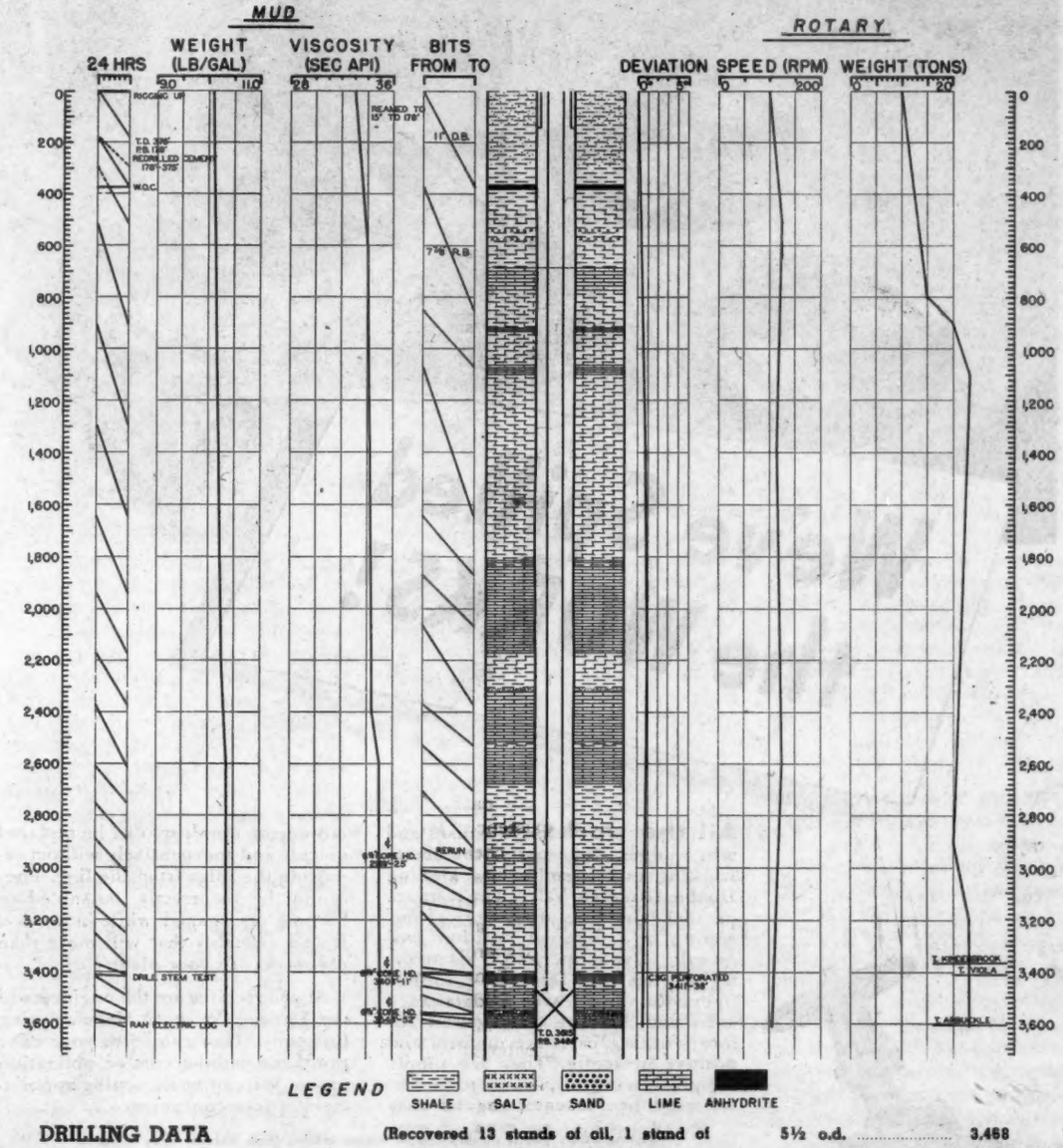

DRILLING DATA

Date spudded	9-30-42
Date well completed	10-28-42
Time record:	
Rigging up	1-2/3 days
Gross drilling time	22 days
Net drilling time (bit on bottom)	328 hours
Number of round trips	27
Type of rig:	
Drilling	Portable power rotary rig
Completion	Cable-tool rig

CORES, TESTS AND SURVEYS

Cores:*	Depth (ft.)
First core	2,919-25
Second core	3,406-11
Third core	3,558-63
Drill-stem test	3,414
(Recovered 13 stands of oil, 1 stand of b.s. and w., and 1 stand of drilling mud.)	
Electrical survey	3,615

*Conventional core barrel.

MUD USED

Native clay and cotton-seed hulls. No chemicals.

BIT RECORD

Type—	Size (in.)	Number
Drag bits	11	1
Drag bits	15	1
Rock bits	7⅞	17
Core heads	6½	3

CASING AND TUBING RECORD

Size (in.)—	Depth (ft.)	Cement (sacks)
12½ o.d.	143	*150
5½ o.d.	3,468	†150
2 (tubing)	3,400	.....

*3 per cent jell. †Bulk cement.

COMPLETION PROCEDURE

Portable power rotary rig replaced with cable-tool rig after cementing of 5½-in. casing.

Hole bailed down and casing perforated with 17 shots, 3,406-14 ft.

Swabbed, and started flowing naturally.

PRODUCTION TESTS

Date	10-28-42
Time flowed	24 hours
Oil production	3,077 bbl.
Water production	None
Gravity of oil	30° A.P.I.

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Engineering Fundamentals

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL No. 55

DECEMBER 3, 1942

STEAM CONSUMPTION OF ENGINES

IN a sense the steam engine is a crude form of steam meter, since a definite volume of steam is taken into the cylinder during each stroke of the engine. Indicator diagrams will furnish sufficient data, when used in conjunction with steam-table information, that the weight of steam consumed by an engine in a given time can be fairly accurately calculated.

An indicator diagram is shown in

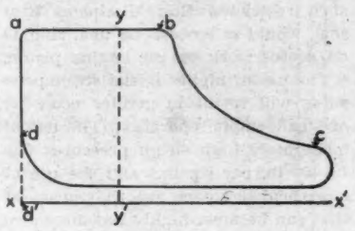

Fig. 1

Fig. 1. As discussed earlier in this series the horizontal length of the diagram can be determined by measuring the length of the atmosphere line *xx'*. The point *b* on the diagram represents cut-off, i.e., the point at which the inlet-steam port is closed and steam flow into the cylinder discontinued. At this time the end of the cylinder on which the diagram is taken is filled with steam. The volume of this steam-filled space can be figured by adding the clearance volume of that end of the cylinder to the volume displaced by the piston up to that point. The clearance volume, if not already known, can be determined by the method described in Installment 54. The volume displaced by the piston up to point *b* can be calculated by expressing the length of the line *ab* as a fractional part of the total length of the diagram (*xx'*), and multiplying this fraction by the piston displacement per stroke for that end of the cylinder.

The product of the volume just determined and the density of the steam under the inlet conditions will give the weight of steam in the cylinder when cut-off occurs. Not all of this steam has been furnished by the boiler during the one cycle under consideration, however, since at the beginning of the cycle the clearance space contained some steam from the preceding cycle. The weight of steam already in the clearance space must be subtracted from the total weight of steam in the cylinder to obtain the weight of new steam actually admitted during one cycle. The point *d* in Fig. 1 represents the point at which steam was admitted to the cylinder. Immediately preceding admission, the clearance space of the engine was filled with steam at a pressure which can be measured by scaling the line *dd'* in inches, perpendicular to *xx'*, and multiplying the scaled distance in inches by the scale of the spring used on the indicator. The density of the steam, derived from steam tables (see Installment 31) can be multiplied by the clearance volume to obtain the weight of this clearance steam.

Having calculated the weight of steam admitted during one stroke, the amount admitted during 1 minute can be obtained by multiplying by the speed of the engine in revolutions per minute. A similar set of calculations can be made based on another diagram from the other end of the cylinder, and using the dimensions of the other end of the cylinder. The total steam consumption of a single-cylinder double-acting engine would be represented by the sum of the weights of steam admitted to the two ends of the cylinder.

It will be noted that in Installment 31 steam density is not given directly. However, specific volume in cubic feet per pound is given, and density in pounds per cubic foot will equal the reciprocal of the specific volume.

In making the calculations outlined, the assumption is made that the steam is in a dry saturated condition. This is not true because of condensation occurring in the cylinder. For this reason, the actual steam consumption of an engine will probably be between 20 and 50 per cent higher than the amounts calculated, even though the steam in the line leading to the engine is of 100 per cent quality.

The calculations just outlined for one end of the cylinder may be placed in the form of the following equation:

$$W = 60\,N D\,[d_1\,(c + C) - d_2 c] \quad (1)$$

where,

W = steam consumption on a given end of a steam cylinder, lb. per hr.
N = speed of engine, revolutions per minute.
D = volume displaced by the piston on the given end of the cylinder, cu. ft. per stroke.
d_1 = density of steam at pressure indicated on admission line of diagram, lb. per cu. ft.
c = clearance ratio of engine. (clearance volume expressed as a fraction of the displacement volume for the one end of the cylinder.)
C = fractional part of piston stroke at which cut-off occurs.
d_2 = density of steam at pressure indicated at point of admission, lb. per cu. ft.

Example.

Problem.—Indicator diagrams taken from a single-cylinder, double-acting steam engine showed the following measurements.

	H.E.	C.E.
Length of diagram, in.	2.95	2.95
Height of steam line, in. (*yy'* in Fig. 1)	1.47	1.41
Height of point of admission, in. (*dd'* in Fig. 1)	0.50	0.46
Length of steam line, in. (*ab* in Fig. 1)	1.86	1.86
Indicator spring scale	120	120

Other data are:

Clearance ratio on both ends, %	16.0
Diameter of piston rod, in.	2½
Cylinder bore, in.	14
Piston stroke, in.	14

Calculate the steam consumption of the engine under the given conditions, pounds per hour, when operating at a constant speed of 200 r.p.m.

Solution.—(1) Consider the head end. The piston displacement on the head end is calculated as follows:

$$D_H = \frac{\pi\,(14)^2\,(14)}{4 \times 1728} = 1.247 \text{ cu. ft.}$$

The cut-off, C, equals $\frac{1.86}{2.95}$, or 0.63.

The pressure of the steam, as indicated along the stream line, *ab*, is 1.47 × 120, or 176 lb./sq. in.

The pressure of the steam in the clearance space at the point of admission is 0.5 × 120, or 60 lb./sq. in.

From the steam tables, Installment 31, the specific volume of dry saturated steam at 176 lb. per sq. in., ga., or 190 lb. per sq. in., abs., is 2.404 cu. ft. per lb. Then, the density, d_2, is 1/2.404, or 0.416 lb./sq. in.

The specific volume of dry saturated steam at 60 lb. ga., or 74 lb., abs., is 5.916 cu. ft. per lb. (see Table 2. Installment 31). Then, the density of the steam is 1/5.916, or 0.169 lb./cu. ft.

Substituting values in Equation 1,

$W = 60 \times 200 \times 1.247\ [0.416\ (0.16 + 0.63) - 0.169 \times 0.16] = 4{,}513$ lb./hr.

Similarly, values for the crank end are calculated and substituted in Equation 1, as follows:

$W = 60 \times 200 \times 1.207\ [0.400\ (0.16 + 0.63) - 0.158 \times 0.16] = 4{,}215$ lb./hr.

Then the steam consumption of the engine is 4.513 + 4,215, or 8,278 lb./hr.

Series prepared by Glenn M. Stearns, associate professor of petroleum engineering, University of Oklahoma

Engineering Fundamentals

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

No. 56

DECEMBER 3, 1942

STEAM ENGINE THERMAL EFFICIENCY

As previously defined in this series, the term efficiency when applied to an engine represents the ratio, output : input, and hence denotes the fractional part of the energy supplied that is converted into work. Mechanical efficiency, which has already been discussed, gives an indication of the power loss within the machine due to friction—a high mechanical efficiency indicating a relatively low amount of power consumed in overcoming friction.

Thermal efficiency represents the fractional part of the total heat supplied to an engine that is actually converted into useful work.

The thermal efficiency may be calculated either on the basis of indicated horsepower or on the basis of brake horsepower. If calculated on the former basis, it is termed the *brake thermal efficiency*, or *over-all thermal efficiency*. When calculated on the latter basis, it is termed *indicated thermal efficiency*.

Thermal efficiency may be calculated by the following equation:

$$E_t = \frac{2545}{W_s (H_1 - H_2)} \qquad (1)$$

Where,

E_t = thermal efficiency, a fraction.
W_s = weight of steam used per horsepower-hour, lb.
H_1 = total heat of steam entering the engine, B.t.u. per lb.
H_2 = heat of steam at exhaust pressure, B.t.u. per lb.

It is well to consider the derivation of Equation 1. One horsepower-hour represents an output of 33,000 × 60, or 1,980,000 ft. lb. of work. Since 1 B.t.u. is equivalent to 778 ft. lb. of work, 1 hp.-hr. is equivalent to

1,980,000/778

or 2,545 B.t.u. The heat energy "input" consumed by the engine in producing this 2,545 B.t.u. of work output is the weight of the steam used (W_s), multiplied by the amount of heat released by each pound of steam ($H_1 - H_2$). So, dividing the heat equivalent of the output by the heat input. Equation 1 is obtained.

It can be seen by inspection of Equation 1 that any measure taken to reduce the quantity of steam used per horsepower-hour will result in an increase in the thermal efficiency. In order to reduce steam consumption, there are certain thermal losses that should be reduced to a practical minimum. The actual loss-reducing measures which can be taken for any set of conditions are limited by economic consideration. It is obvious that more elaborate, thermally efficient installations can be justified when applied to an operating condition where fuel is expensive or water is scarce than would be warranted when these two items are cheap and plentiful. At least, the rule that governs is whether the fuel or water saving will be sufficient to amortize the additional expenditure necessary for the operator to install a more efficient engine.

The heat losses that occur in steam engines include heat of exhaust steam, initial condensation, reevaporation, incomplete expansion, leakage, radiation, clearance-volume losses, and wire drawing.

By exhausting an engine into a condenser at low pressure, a greater thermal efficiency is secured because each pound of steam releases more of its heat content within the engine cylinder. This is not always desirable, though, because of the fact that cylinder condensation may result as an offsetting factor and because that the worth of the steam may not be sufficient to pay for the condenser.

Cylinder condensation is more severe in small cylinders than in large cylinders because the small cylinders have a greater ratio of surface to steam volume. The amount of surface in the clearance space of an engine influence the amount of cylinder condensation that takes place. It is probable that the greater part of the condensation takes place in the clearance space, because of the longer contact of the steam with the clearance surfaces and because of the comparatively high ratio of surface to volume within this space. Use of superheated steam, rather than saturated steam, as the working fluid is the most satisfactory means of reducing condensation losses. Even though saturated steam is used, cylinder condensation can be reduced by steam jacketing of the engine cylinder, which consists of making the cylinder walls and cylinder head double and circulating live boiler steam through them.

Leakage of steam past the piston or valves into the exhausting end of the cylinder represents loss of steam without its being utilized in producing useful work. Thus, the maintenance of proper surfaces on valves, valve seats, cylinder walls, and piston rings is important in maintaining high thermal efficiency.

The throttling action of the valves as they open and close, and of small ports, may produce what is termed "wire drawing." Wire drawing is undesirable because the pressure loss in such restricted flow dissipates heat that would otherwise be available to do useful work on the engine piston.

The use of higher initial steam pressures will result in greater economy of steam-engine operation. The use of moderately high steam pressures (up to 400 lb. per sq. in.) and the use of superheated steam are the measures that can be most highly recommended for securing greater economy under the average set of field conditions. Even though these two measures may result in a marked increase in thermal efficiency, they cannot always be justified, particularly where water is plentiful and fuel is cheap.

Example

Problem.—A test of a steam engine shows that it uses 1,560 lb. of steam per hour when developing 40 b.hp. At the same time, the engine is developing an indicated horsepower of 50. The inlet steam is 95 per cent quality at 250 lb. per sq. in. abs. pressure. Exhaust pressure is 14.7 lb. per sq. in. abs.

Calculate:

1. Brake thermal efficiency.
2. Indicated thermal efficiency.

Solution:

1. Steam consumption of engine = W_s = 1,560/40, or 39 lb. per b.hp.-hr.

The heat in 1 lb. of entering steam = H_1 = 376.04 + 0.95 × 825.4 = 1,160.17 B.t.u. (see steam table — Installment 31).

The heat of the liquid of 1 lb. of exhaust steam = H_2 = 180.07 B.t.u. (from steam table, Installment 31). Then, brake thermal efficiency is

$$E_t = \frac{2,545}{39\ (1,160.17 - 180.07)} = 0.0666 \text{ or } 6.66\%$$

2. The steam consumption based on indicated horsepower is 1,560/50, or 31.2 lb. per b. hp.-hr. Then, indicated thermal efficiency is

$$E_t = \frac{2,545}{31.2\ (1,160.17 - 180.07)} = 0.0832 \text{ or } 8.32\%$$

Series prepared by Glenn M. Stearns, associate professor of petroleum engineering, University of Oklahoma

Modern Technique in Oil-Well Cementing

(Continued from Page 57)

when pump pressure is applied the sleeve is forced downward, exposing the fluid ports, and permitting circulation to be established inside the liner. The ball prevents further fluid from following the placed cement down through the shoe. Circulation can be continued the long way, or reversed, to wash out excess cement. After the cement has taken its initial set the running-in string, with the sub and expansion joint, then can be removed as before.

Two methods of multiple-stage cementing of casing are described. One calls for the use of a removable cementing tool equipped with opposed swab cups which "straddle" cementing ports in the casing collar and which is run in on an auxiliary cementing string. The collar in this case is essentially a casing collar with a number of fluid ports, which are covered on the outside by a rubber sleeve, reinforced by a number of springs. With the cementing tool in place, the opposed swabs confine the pressure to the location of the collar. The pressure opens the sleeve which permits passage of the fluid outward through the ports. The sleeve serves as a back-pressure valve to prevent any return flow of cement into the casing. As many collars can be placed in the string as there are desired cementing points. Cementing is started at the lowest collar. The operation is repeated at each successively higher cementing point.

In the other method an auxiliary cementing string or special running-in tools are not used but the cementing collars are of a more complex type. The collar described has an internal special plastic plug, with a hole through the center, which is held in place normally with shear screws covering the cementing ports until tripped. The ports are covered with a rubber sleeve held by reinforcing springs. With this collar, either the plug method of cementing or simple displacement can be followed.

A float shoe, having side ports, is used in the job. Circulation is established by pumping fluid down the casing and up the outside, thus making certain that the ports of the shoe are open. With the plug method, the cement for the first stage is pumped in, and then followed by a flexible cementing plug, which insures that the uncontaminated cement is pumped through the side ports of the shoe until the plug hits the shoe. Seating of the plug prevents further fluid from being pumped out of the casing at the shoe. The flexible plug can be pumped through the plastic sleeve without tripping it and opening the collar ports, yet it functions as a top cementing plug in passing through the entire casing string.

After completion of the cementing job at shoe, the bridging ball for the collar is dropped into the casing and allowed to gravitate to its seat in the plastic plug in the collar. Pressure is applied to the fluid in the casing, which shears the screws holding the plastic plug in the collar and sliding the plug with the ball seated upon it downward until stopped by the shoulder formed by the pin end of the casing. This uncovers the cementing ports in the collar, providing a passage for fluid or cement out through the ports and into the annulus between the casing and the open hole. The ball, seated below the cementing ports, acts as a bridge to prevent downward passage of fluid through the casing, leaving the cementing job below the collar undisturbed. The cementing job at the collar then is performed by the standard plug method. When the cement at this point and at the shoe is set, the plastic plug in the collar and the integral concrete plug and plastic valve assembly in the shoe can be drilled out.

BOOKS

THE CHEMICAL TECHNOLOGY OF PETROLEUM. By W. A. Gruse and D. R. Stevens.

From the recent applications of thermodynamics in solving problems of hydrocarbon chemistry, to the production and uses of derived byproducts, this book discusses the chemical fundamentals of petroleum production, refining and utilization. It proceeds from a detailed description of the important types of petroleum to a critical comparison of various methods of refining and distilling and the process of cracking. It includes a thorough discussion of all petroleum products and byproducts.

The Chemical Technology of Petroleum may be purchased through the Book Department of The Oil and Gas Journal at the established retail price of $7.50, postage prepaid (extra outside the United States), and a copy will be forwarded promptly upon receipt of a money order for that sum. Where payment is not provided, the book will be sent c.o.d. to avoid delay.

•

A REVIEW OF LEASE HOUSEKEEPING PRACTICES and THE STATE'S RESPONSIBILITY IN OIL AND BRINE POLLUTION ORIGINATING IN OIL FIELDS. By Ogden S. Jones. Kansas State Board of Health, Lawrence, Kans.

These two pamphlets of 15 and 20 pages, respectively, cover good and bad practices connected with cementing wells and a review of legislation and studies by state and federal governments on pollution.

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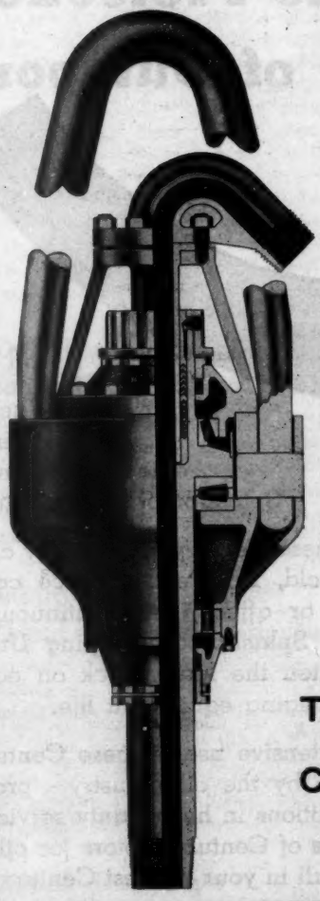

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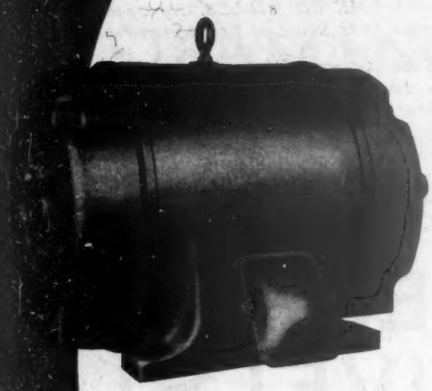

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REFINERY ACTIVITY AND EXPANSION

Refinery Aid to Russia Will Involve Outlay of 15-20 Million

Refinery equipment to be supplied Soviet Russia for the production of high-octane gasoline and aviation lubricating oils will have a total value of approximately $15,000,000 to $20,000,000, it was announced in Washington, D. C., last week. The estimated sums are exclusive of facilities to be added when the plants are rebuilt in Russia.

In disclosing the projected goal of aiding Russia with establishment of adequate refinery facilities in less vulnerable parts of the country, the Office of War Information revealed that purchase of the Douglas Oil & Refining Co. plant at Wilmington, Calif., was only one phase of the program. OWI described the Douglas transaction as "a small but important part" of the United States' program to assist Russia under provisions of the lend-lease arrangement.

Engineering and procurement preliminaries on remainder of the equipment to be dismantled in this country and shipped to the U.S.S.R. are in various stages of consummation. Clifton E. Mack, director of procurement for the Treasury Department, is in charge of the refinery-purchase program.

Badger Awarded Contract For Sun's Butadiene Plant

TOLEDO, Ohio.—Sun Oil Co., acting in conjunction with Defense Plant Corp., has awarded construction contract for a butadiene plant at its Toledo refinery to E. B. Badger & Sons Co., Boston, Mass.

The process selected for Sun's plant is catalytic dehydrogenation of butane. Capacity will be approximately 15,000 short tons annually.

Stock Pledges Total $223,000 to Ohio Cooperative Refinery

COLUMBUS, Ohio. — Pledges totaling $223,000 for preferred shares in the Ohio Farm Bureau Cooperative Association's program to construct and operate a refinery have been made.

J. E. Keltner, Columbus, assistant treasurer of the association, said that 1,640 individuals had subscribed to 4,460 shares in the cooperative refinery project.

Women's Work in Refineries To Be Discussed Before W.P.R.A.

A special meeting of the Western Petroleum Refiners Association will be held December 4, at the Hotel Tulsa, Tulsa, beginning at 4 p.m.

The program will feature a talk on "Saving Manpower for War Power," by H. W. Boggess, superintendent of insurance, employment, and safety, Sinclair Refining Co., Tulsa. Chairman of the meeting will be E. D. Murphey, safety director of Mid-Continent Petroleum Corp.

One particular phase to be discussed by Mr. Boggess is the induction of women to fill positions left vacant by men called to the colors. Such changes have already begun in the refining and other divisions of the oil industry. These changes involve new and different problems, especially safety hazards. There are the important factors of psychology, classifications that women can fill, their proper training, hours to be worked, most sensible attire while working, weights to be lifted, and various others. A round-table discussion will follow the talk.

Eastern Refineries Making Nonwar Products to Be Closed

WASHINGTON, D. C.—Orders are being issued to close all oil refineries in District 1 (East Coast) which are not producing petroleum war products, Petroleum Coordinator Harold Ickes told Senator Truman's investigating committee last Friday.

This was done, he explained, to avoid the waste of approximately 6 per cent in refining and in order to get the maximum delivery of petroleum products with available transportation. Sen. Ralph O. Brewster of Maine, a member of the committee, had criticized the OPC for permitting the use of tank cars for crude-oil movement instead of confining them to fuel oil and other products immediately needed in the East.

Mr. Ickes explained that only 10 per cent of the crude shipped into the East has been going to refineries not producing war products, but even this quantity is being stopped. However, about 40 per cent of the oil shipped into the eastern region will continue to be crude.

North Dakota Issues Winter Gasoline Specifications

Winter gasoline specifications in North Dakota, effective December 1 and continuing through the first 3 months of 1943 require 10 per cent evaporation at 149° F. Specifications also call for a vapor pressure of 13 lb. from tank cars from October 1 to June 1.

Standard Method of Test For Lead in Gasoline Adopted

A standard method of test for tetraethyl lead in gasoline has been approved by the American Standards Association. Under the approved method (A.S.A. No.: Z11.48-1942) the tetraethyl lead is converted to lead chloride by refluxing with hydrochloric acid, and the lead determined volumetrically by titration with ammonium molybdate or gravimetrically as the chromate or sulfate.

Standard Color Code

The American Standards Association announced last week that both the War Production Board and the National Machine Tool Builders Association have requested that work be started at once on a standard color code for lubricants, as a war-emergency project. Purpose of this standard will be to indicate by color the grade of greases or oil to be used in a given part of a machine.

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ECOLITE—92BM
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TWICE APPROVED FOR
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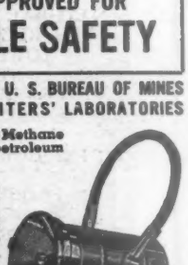

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THE OIL AND GAS JOURNAL

Pipe-Line Activity

Looping Programs Increase Crude-Oil Flows Eastward

WASHINGTON, D. C.—An additional 27,000 bbl. of crude oil will flow daily in the near future to the East Coast as a result of adjustments recently made on a number of pipe lines.

This additional movement has been counted on in forecasts of supply for the coming winter and therefore will not change the current shortage situation.

"Capacity delivery of 20,000 bbl. daily over the recently reversed Tuscarora line—which extends from Nagley, Ohio, to Bayonne, N. J.—will begin as soon as it can be tested and such minor adjustments made as are necessary in pipe lines that have been reversed," Coordinator Ickes said. "The additional 7,000 bbl. will be hauled by other lines. When the 27,000 bbl. a day are added to present pipe-line movement, we will have approximately 100,000 bbl. of crude oil daily flowing into the eastern states through connecting pipe-line systems."

Adjustments on existing pipe lines were made under what is known as the Coordiator's Project 1. Now, in effect, there are two pipe-line systems that carry crude oil directly from the Midwest and Southwest to the East Coast refining areas.

Deputy Coordinator Ralph K. Davies explained that work on the lines included reversing the flow of some, increasing the number of pumping stations along the route, and adding loops to increase the capacity of the lines.

Thus, through reversing the flow of part of its lines and by adding loops, the Texas Pipe Line Co. hauls an additional 18,000 bbl. of oil a day northward, from the Texas fields to Seminole, Okla.

From Seminole, the Texas-Empire line carries the oil to Chicago. Capacity of this line has been increased 30,000 bbl. a day by the construction of more pumping stations and installing loops. Approximately 22,000 bbl. of this increased daily supply are shipped eastward, while the remainder is required for use in the Chicago area.

The additional 22,000 bbl. of oil are pumped by the Indiana Pipe Line Co. from Chicago to the Indiana-Ohio state line, at which point it continues through the Buckeye pipe line system into Lima, Ohio.

From Lima, Buckeye delivers approximately 73,000 bbl. daily to several other pipe lines that connect directly with East Coast points. This represents an increase of 12,000 bbl. daily because of adjustments made along the entire route.

Also scheduled to deliver oil directly from Texas to Lima, Ohio, as a result of improvements and changes made under the coordinator's Project 1 is the Stanolind-Illinois pipe lines' hookup.

The Stanolind, by adding loops along its Texas line and remodeling some of its pumping stations, will increase deliveries to Chicago and Wood River, Ill., by 8,000 to 10,000 bbl. daily. About 5,000 bbl. of this increase will be sent eastward via the Illinois pipe line to Lima.

Thus, there will shortly flow into Lima for East Coast delivery, via the two routes connected under Project 1, 73,000 bbl. daily over the Buckeye line and 27,000 bbl. daily on the Illinois line.

The Buckeye line delivers its load to Bear Creek, Pa., and Cooks Ferry, Pa., from which points the oil is "fanned out" to various eastern points—principally Buffalo, Pittsburgh, Philadelphia, and New York—through use of part or all of the following pipe-line systems: Southwest Penn, Eureka, Southern, Pure, Northern, National Transit, New York Transit, Tuscarora, and Tide Water.

The Illinois line is now feeding 15,000 bbl. of oil a day directly into the recently reversed Tuscarora line at Nagley, Ohio. Another 5,000 bbl. a day will enter the Tuscarora system at Maharg, Pa., from the Buckeye via connecting lines.

To help handle the additional 27,000 bbl. of oil a day that will be shipped to the East Coast by these pipe lines, the Tide Water pipe line has increased its capacity to 2,000 bbl. a day by installing new pumping stations and the Southern Pipe Line raised its capacity 5,000 bbl. a day by increasing the facilities of its present pumping stations. The Tuscarora line takes 20,000 bbl.

Looping of Illinois Line in Ohio Has Been Completed

The laying of 152 miles of 8-in. between Lima and Sparta, Ohio, on Illinois Pipe Line Co.'s trunk system has been completed by the contractor. Sheehan Pipe Line Construction Co. The work

Heavy river clamps installed to hold down pipe laid across swampy land in the course of laying of pipe by Sheehan Pipe Line Construction Co. to loop Illinois Pipe Line Co.'s trunk line across Ohio

has been financed by Reconstruction Finance Corp. through its subsidiary Defense Plant Corp., in order to increase eastward flow of oil in accordance with OPC's Project 1.

Second Texas-East Coast Line May Start at Gulf Coast

WASHINGTON, D. C.—A meeting of the engineering subcommittee of the District 1 transportation committee is to be held here this week to discuss details of the 20-in. products line, application for which is now before War Production Board.

In announcing last week that application had been made for the line, Petroleum Coordinator Ickes declined to give details as to location or amount of material required.

However, it is reported that its origin point will be in the Gulf Coast area, that the refined products which it will carry to the East Coast will be taken largely from that area, with possible terminals in Houston, Beaumont and Corpus Christi, and that it will be somewhat longer than the 24-in. crude line now being constructed.

Although it was originally planned that the new line should carry only refined products, it may be that it will be called upon to carry crude east a part of the time, because of the critical situation in the eastern part of the country and the heavy demand for oil to supply military needs in Africa and Europe.

The meeting scheduled for this week will have as its adviser Maj. J. R. Parten, Houston, Tex., chief of OPC's Transportation Division, and it is expected that details of the proposal will be handed to WPB late this week or early next.

As planned, the line would be able to bring 200,000 to 250,000 bbl. per day of products or crude to the East. It would not follow the route of the present 24-in. line, but would extend from the Texas Gulf Coast across Louisiana, and up through the eastern part of the country, according to tentative plans.

Prospects for its approval by WPB are not good, OPC officials conceded, but they are hopeful that the board will recognize the need for the line as a wartime requirement and allocate the materials necessary for its construction. The board refused for nearly a year to approve the 24-in. crude line from East Texas to New York and Philadelphia, but finally granted materials for it when the oil situation in the East became acute.

While details cannot be divulged because of military secrecy, it is known that heavy shipments of oil from North Atlantic ports to England and North Africa now are being made and military authorities hope to step them up. This situation, more than any other single factor, has made industry and OPC hopeful that the second pipe line will be approved.

A list of the firms awarded contracts by War Emergency Pipelines, Inc., for the construction of the extension eastward from Norris City, Ill., to the New York-Philadelphia area appears elsewhere in this issue together with a progress report on the 24-in. line for moving crude oil and No. 2 heating oil from Texas to the East Coast.

Plans Are Made for Supplying Factory Bends to W.E.P.

In preparation for supplying 23,000 factory bends for War Emergency Pipelines, Inc.'s extension from Norris City, Ill., to the East Coast, A. O. Smith Corp. is revamping equipment used in making bends for the 26-in. pipe laid last year by Natural Gas Pipeline Co. of America. Factory bends will be made at the rate of 150 to 165 per day.

Construction men with experience in the installation of bends of the 26-in. natural-gas line to Chicago, say that factory bends should be an important aid in laying the line, particularly in mountainous country where there are difficulties in moving heavy equipment.

Sinclair Prepares to Remove Pipe to Build 585-Mile Line

In anticipation of constructing a 585-mile 8-in. line from Wood River, Ill., to Steubenville, Ohio, Sinclair Refining Co. is reported to have made preliminary arrangements for removing pipe from its existing crude-oil system. Part of this pipe may be dug up on the trunk line between Carrolton, Mo., and Wood River, Ill.; 75 miles may be removed from the company's system in the vicinity of Augusta, Kans.

To supply pipe for the crude-oil line now being laid by O. C. Whitaker Co. for Sinclair Refining Co. from Corpus Christi to Damon Mound, Tex., 230 miles of pipe is being dug up by two contractors from the company's line between Ringling, Okla., and Kingsmill, Tex. O. C. Whitaker Co. has already removed approximately 100 miles, working north from Ringling. O. E. Dempsey Construction Co. has taken up 70 miles while working south from Kingsmill; this firm has field headquarters at Shamrock, Tex.

Plantation Starts Laying Of Pipe for Extension

Laying of pipe has been started for extending the Plantation Pipe Line Co.'s system from Greensboro, N. C., to Richmond, Va. The project is supervised by S. R. Simmons of Standard Oil Co. of Louisiana. Operations of the contractor, Williams Brothers Corp., are handled by H. L. Davis, superintendent.

The contractor is putting three spreads on the job, two of which are already in the field. In addition to the spread working out of Greensboro one is working near Chase City, Va. The third spread will start soon near Clarksville, Va.

Pipe for the project is being taken up by the contractor in the Del Rio, Tex., area at the rate of 10 miles a day from a line formerly operated by Illinois Pipe Line Co. In digging up pipe, three gangs are making extensive use of plow-type equipment specially made for this work.

Stanolind Looping Program In Texas Is Under Way

In the first 11 days of construction, 14 miles of pipe has been welded in the laying of 52 miles of 12-in. for looping the trunk line of Stanolind Pipe Line Co. in North Texas. Approximately 8 miles has been backfilled. The loops are being laid in the vicinity of the Graford and Bowie, Tex., stations. The undertaking is financed entirely by Stanolind to increase facilities for moving crude oil from Texas toward the East Coast, as part of OPC's Project 1.

The contractor, Jones & Brooks, has established field headquarters at Nocona, Tex.

Ashland Prepares for Coil, Ill., Pool Outlet

Arrangements are being made for the laying of a 10-mile 4-in. crude-oil line for Ashland Oil & Refining Co. to furnish an outlet from the Coil pool in Wayne County, Illinois, which will extend to a point in the Johnsonville area. The line will connect with the trunk system of Sohio Pipe Line Co. Right-of-way is being purchased now.

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125 BPH at 417 lbs.

3" to 6" x 6" V-Belt or Direct
68 BPH at 767 lbs.
288 BPH at 181 lbs.

2½" to 5" x 10" Direct Drive
59 BPH at 1325 lbs.
278 BPH at 330 lbs.

2½" to 7" x 10" Direct Drive
92 BPH at 920 lbs.
557 BPH at 168 lbs.

2½" to 5" x 10" V-Belt
59 BPH at 1400 lbs.
278 BPH at 405 lbs.

3" to 7" x 10" V-Belt
92 BPH at 1203 lbs.
557 BPH at 202 lbs.

2½" to 7" x 10" V-Belt
92 BPH at 1400 lbs.
557 BPH at 303 lbs.

3" to 8" x 10" V-Belt
92 BPH at 1400 lbs.
733 BPH at 230 lbs.

TRIPLEX

3" to 5¾" x 8" V-Belt Drive
156 BPH at 1605 lbs.
631 BPH at 396 lbs.

QUINTUPLEX

2½" to 4" x 6" V-Belt
199 BPH at 1500 lbs.
555 BPH at 600 lbs.

3" to 5¾" x 8" V-Belt
260 BPH at 1605 lbs.
1050 BPH at 396 lbs.

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Rack Type — Self Cleaning Disc. Has Teeth and Rides a Rack Cast in Valve Body. Cleans each operation — never freezes — easier to operate.

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Rack Type: Gate and Check Together

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STRAINERS

GASOLINE or CRUDE OIL
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TULSA OKLAHOMA

On a Sunday morning twelve months ago, America got out of bed and yawned and breakfasted, went to church and read the funnies or took a walk with the kids. We were a big, sleepy, good-natured people who only half believed that such things as war existed.

A few hours later we were awake. The thing that made us awake was treacherous and brutal, but the shock of it was as bracing as an icy shower. We knew, at last, where we stood and what we had to do.

You have a broad idea of what the nation has accomplished in this first year of war. We now report to you on what the men of one company have done and are doing.

Long before last December, "Caterpillar" Diesel Tractors and Motor Graders, Engines and Electric Sets were busy on what was then called "defense" work. With the country's entry into war, "Caterpillar" production was turned wholly to war purposes, and our plants, already working three shifts a day, stepped up their output of machines. Additional space was built. More workers were trained.

Throughout this crucial year, 100 per cent of this increased "Caterpillar" production has been going into the war effort—the vast majority of it directly to the *combat forces* of the Army, Navy and Marine Corps, and for our fighting allies. On all the world's battlefronts these machines are in the thick of the struggle for freedom. "Caterpillar" Diesel equipment is clearing beach-heads for attack troops, hauling big guns, building and repairing landing fields, drilling wells and pumping water. It is powering naval craft and generating current for lights and communications, afloat and ashore. But our report would be far from complete if it dealt only with combat activities. Here at home, thousands of older "Caterpillar" machines have been performing what appears to be a miracle. With no new machines coming from the factory to replace them—with fewer men to do the vital wartime jobs, and with heavier loads and longer hours a necessity—they have stood up under grueling punishment, month after month. In industry and construction, in mines and lumber camps and on the farms, "Caterpillar" Diesels are making a mighty contribution to the war effort.

They're no orphans—these tough, veteran machines. They are under able and expert guardianship. Back of their record of performance stand the "Caterpillar" dealers who have met the challenge of this emergency with energy and courage, and have shouldered full responsibility for keeping "Caterpillar" Diesel equipment doing its sturdy best.

With a large supply of replacement parts, and with complete service facilities available night and day, "Caterpillar" dealers everywhere are pledged to keep "Caterpillar" Diesel Tractors, Graders, Engines and Electric Sets delivering all of the long life and dependability that are built into them.

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TO WIN THE WAR: WORK — FIGHT — BUY U. S. WAR BONDS!

FIELD DEVELOPMENTS...

HIGHLIGHTS FROM THE WEEK'S NEWS—

With completions falling below 300 wells for the first time in many weeks, and fewer oil wells completed in the whole of the United States than used to be put on production in a single week in Texas alone, it is high time that the country was made aware of the fact that gasoline rationing may soon be necessary to save gasoline no matter how the rubber situation develops. This week reports from the Appalachian area show declining production with increased demand. Michigan has seen a succession of weeks of minimum activity. Nothing in the way of discoveries has appeared in the Illinois basin to do more than slow slightly the decline in production there. Elsewhere, discoveries and extensions are less numerous than during normal times and the possibilities of major production appear to be following the trend of recent years when the average production per new field has fallen sharply.

Within a short time, the oil industry will be in distress and will be blamed for having been ultraoptimistic concerning its achievements in the past. The fact is, of course, that any claims that the oil industry could meet demands did not presuppose a reduction of 40 per cent in drilling and a complete suspension of the laws of supply and demand, thus preventing wildcatters from conducting their normal operations. The situation has ceased to be one of "business as usual" and if the term "emergency" has not been worked to death, it could well be revived.

The industry is not now in a position to help itself. An oil czar analagous to the rubber director would face different problems. The rubber emergency was fully appreciated long before the director was appointed. The public knew about the rubber shortage but it has not been informed about the impending oil shortage. The government agencies to which the rubber director must go for cooperation have already had experience with the rubber problem but they have not been made aware of the oil problem, or possibly, decline to be made aware of it.

There is considerable emphasis being placed on secondary-recovery projects. The relief obtainable from this source would be welcome but it cannot be expected to mount into the hundreds of thousands of barrels daily within 2 years. That may be the measure of the nation's oil deficiency.

LOUISIANA GULF COAST: A big gas-distillate flow has been reported from Union Sulphur's Acadia Parish test. Evangeline Parish wildcat reports three oil sands after deepening from 8,497 ft. where it was abandoned last February (p. 79).

MISSOURI: A possible Bartlesville sand discovery is being tested in Atchison County. This may open production for Missouri in the Forest City basin (p. 75).

OHIO: A new Clinton gas pool has been opened in Coshocton County (p. 78).

WEST TEXAS: A south outpost to the Abell Ordovician field suggests a considerable development in that direction. Soma-Noelke in Crockett County and the Sand Hills deep field in Crane County have also been extended (p. 79).

TEXAS GULF COAST: A new shallow field has been opened up northwest of Edna, Jackson County, and a southeast outpost to the West Mauritz field has reported a new sand (p. 73).

NORTH CENTRAL TEXAS: A new Mississippi lime field in Clay County and a Strawn sand field in Montague County are announced. A Throckmorton County discovery yielded oil and water on the pump from Mississippi lime (p. 72).

SOUTHWEST TEXAS: The second deep Edwards lime test in Atascosa County found the lime tight and showed nothing on test. The second well in the Poth pool, Wilson County, is showing about 50 per cent water and little oil (p. 73).

CALIFORNIA: Either a new field or a 1-mile east extension to the Strand field has been found. The gas fields in the San Francisco area are going on full operation but the 640-acre spacing rule is preventing further development drilling. A deep sand in the Aliso Canyon field may prove a major discovery (p. 76).

WYOMING: A new black-oil field has been opened in the Tensleep of Elk Basin in Park County. Most of the oil from this field has been a light crude from the Frontier. The Notches field, Natrona County, has gone on production after a 3-year shutdown. It is also a heavy-crude producer (p. 77).

OKLAHOMA: A formerly reported discovery in Okfuskee County went dry after it had made nearly 200 bbl. of oil and 3,000,000 cu. ft. of gas in 1½ hours (p. 72).

EAST TEXAS: With several wildcats being abandoned, interest remains centered in the Wood County Paluxy sand discovery preparing to test (p. 73).

PENNSYLVANIA: Declining production and peak refinery demand have drawn heavily on stocks and fears of a shortage are expressed (p. 72).

ALBERTA: The government-owned Canadian National Railways is undertaking development in the Vermilion field in order to secure fuel oil (p. 78).

MICHIGAN: With only two oil wells in 13 completions and three permits during the week, activity is at a minimum (p. 79).

ILLINOIS: A test south of the State Game Farm in Jefferson County reports production from the McClosky, Levias and Aux Vases. A northeast outpost of the Bluford pool, also in Jefferson County, is preparing to test the McClosky (p. 75).

COMPLETIONS IN ALL FIELDS . . .

(Week Ending November 28, 1942)

	Oil	Gas	Dry	Total	Footage	Ttl. comp. to date 1942	Ttl. comp. to date 1941
N. Y., Pa., and W. Va.	45	8	8	61	117,556	3,248	5,465
Ohio	6	12	5	23	60,642	1,060	1,558
Indiana	3	2	4	9	15,237	330	467
Kentucky	0	3	0	3	7,272	233	614
Illinois	21	0	15	36	81,151	1,735	3,352
Michigan	2	1	10	13	35,238	646	843
Kansas	12	0	15	27	91,537	1,440	1,976
Nebraska	0	0	2	2	5,456	33	76
Missouri, Iowa	0	0	0	0	0	13	34
Oklahoma	7	2	10	19	67,513	1,077	1,721
Texas:							
North Central Texas	8	0	8	16	51,003	1,008	2,615
West Texas	6	0	2	8	39,616	1,221	2,096
Texas Panhandle	1	3	0	4	12,153	328	636
Eastern Texas	2	1	1	4	18,061	371	953
Texas Gulf Coast	5	0	3	8	52,608	637	986
Southwest Texas	8	1	9	18	85,474	976	1,716
Total Texas	30	5	23	58	258,915	4,541	9,002
North Louisiana	3	1	4	8	32,651	459	715
Louisiana Gulf Coast	3	0	3	6	52,227	435	791
Total Louisiana	6	1	7	14	84,878	894	1,506
Arkansas	2	0	2	4	16,677	171	185
Mississippi and Southeast	0	0	0	0	0	70	260
Montana	3	1	0	4	7,094	188	270
Wyoming	2	0	0	2	7,092	104	165
Colorado, Utah	0	0	1	1	4,527	23	30
New Mexico	5	1	0	6	16,345	243	257
California	14	0	0	14	36,238	714	1,036
Total United States	158	36	102	296	913,368	16,763	28,817
Total previous week	193	33	93	321			
Week ended Nov. 29, 1941	425	46	115	586			

APPALACHIAN FIELDS

Crude-Oil Stocks Decreasing In Appalachian Area

PITTSBURGH, Pa.—Dwindling stocks of Pennsylvania Grade crude oil combined with continued peak refinery operations is beginning to cause some apprehension as colder weather approaches. Stocks now available appear sufficient to carry through during the next 2 months but beyond that is unpredictable. Production expansion has not kept pace with refinery consumption.

SOUTHWEST PENNSYLVANIA

In Slippery Rock Township, Lawrence County, T. W. Phillips Gas & Oil Co. is drilling at 5,340 ft. in the Salina in the test on the Delilah Hill farm. This is a Clinton test.

On Chestnut Ridge in South Union Township, Fayette County, Peoples Natural Gas Co. is drilling at 5,960 ft. in a new hole in the 1 Walters. New Penn Development Co., William E. Snee et al have reached 4,632 ft. in 2 Indian Creek Coal Co.

SOUTHWEST PENNSYLVANIA COMPLETIONS

Greene County, Morris Township: Carnegie N. G. Co. 2 A. M. Beabout, dry, through Fifth, T.D. 3,319 ft.
Washington County, Cross Creek Township: John Johnson & Co. 2 E. Denny Brown, dry, T.D. 1,231 ft.

WEST VIRGINIA

In Spring Creek district, Wirt County, Benedum & Trees set 7-in. casing at 5,440 ft. in the deep test on the Park Smith farm and in the Corniferous lime, the top of which has not been placed. In Meade district, Tyler County, these operators are drilling at 6,214 ft., or 177 ft. in the Corniferous lime, in the test on the Pearl Broadwater farm. No progress was made in the test on the W. W. Campbell farm in Union district, Pleasants County.

In Marsh Fork district, Raleigh County, Columbia Carbon Co. is drilling at 3,155 ft. in the 663 Rowland Land Co. with the Big lime topped at 2,181 ft. and the lime gas now gaging 29,800 cu. ft.

WEST VIRGINIA COMPLETIONS

Braxton County, Salt Lick district: Pittsburgh & West Virginia Gas Co. 7821 W. T. Brown, reported as dry; will be saved as gas well after tests showed the gage of 31,000 cu. ft. gas had a R.P. of 355 lb. in 48 hr., T.D. 2,093 ft. through Injun sand.
Calhoun County, Lee district: Everett Starcher et al 1 Ernest Roach, dry, Big lime 1,645 ft.; Injun 1,717 ft., T.D. 1,847 ft.
Clay County, Buffalo district: Pittsburgh & West Virginia Gas Co. 7891, dry through Injun sand, T.D. 1,967 ft.
Henry district: Clay Gas Co. 9 Adena Corp., dry in Injun sand, T.D. 1,703 ft.
Virginian Gasoline & Oil Corp. V-1327 Brown, Swann & Goshorn, 3 bbl., Injun sand, T.D. 1,700 ft.
Gilmer County, Troy district: Mud Lick Oil & Gas Co. 1 D. L. Means, 20,000 cu. ft. gas in Big Injun sand, will plug and abandon, T.D. 2,071 ft.
Kanawha County, Poca district: Columbian Carbon Co. 13 Homer C. Jones, 36 bbl. before acidizing, Big lime top 1,649 ft., T.D. 1,740 ft.
Lincoln County, Jefferson district: David Gas Co. 1 Mont McNeely, 933,000 cu. ft. gas, Big lime, T.D. 1,789 ft.
Marion County, Mannington district: South Penn Natural Gas Co. 7 John Kennedy, 3 bbl. and 138,000 cu. ft. gas, Gordon sand, T.D. 2,990 ft.
Monongalia County, Battelle district: Manufacturers Light & Heat Co. 3674 Noah Henderson, 125,000 cu. ft. gas Fourth and Fifth sands, T.D. 3,394 ft.
Ritchie County, Union district: Moats & Barker 1 Linna L. Davisson, 39,400 cu. ft. gas, Maxton sand 1,640 ft., Big lime 1,775 ft., Injun 1,840 ft., T.D. 1,960 ft.
Upshur County, Banks district: Cumberland & Allegheny Gas Co. 333 P. A. Darnell, 1,434,000 cu. ft. gas, Squaw sand, T.D. 1,718 ft.
Buckhanan district: Pittsburgh & West Virginia Gas Co. 7904 M. H. Higginbotham, 137,000 cu. ft. gas, Benson sand, T.D. 4,505 ft.
Meade district: Earl Goodwin 1 E. G. Brown and A. J. Bean, dry and abandoned; T.D. 2,100 ft.
Hanley & Bird 1 Long-Fitzgerald, dry, through Benson sand, T.D. 3,810 ft.
Wood County, Walker district: Clifton Oil & Gas Co. 4 Volcanic Oil & Gas Co., 4 bbl., Berea, T.D. 1,608 ft.

ORISKANY GAS FIELDS

Jackson County, Ripley district: Godfrey L. Cabot, Inc., 1044 E. B. and R. H. Winters, dry through Oriskany sand; shot 5,188-5,204 ft.; gage 103,000 cu. ft. gas; T.D. 5,275 ft. will abandon.
Washington district: Columbian Carbon Co. 674 J. S. Carder, 5,034,000 cu. ft. gas; Corniferous lime 4,903 ft.; Oriskany 5,066-5,126 ft.; shot 5,066-5,116 ft.; R.P. 1,700 lb. 48 hr.; T.D. 5,136 ft.

OKLAHOMA FIELD REPORT

Okfuskee County Test Completed As Dry Hole After Flowing Oil

By CARL HOOT

OKLAHOMA'S discoveries backed up one last week when Mid-Continent Petroleum Corp.'s Okfuskee County wildcat, 1 Reed, NW NW SE 30-12n-7e, was completed dry after making a number of prolific flows of oil.

Drilled to total depth of 4,556 ft., the well logged Hunton at 4,256 ft., Viola at 4,442 ft., first and second Wilcox sands at 4,508 and 4,533 ft. and set 7-in. casing at 4,556 ft. After squeezing off perforations at 4,440-70 ft., 32 shot at 4,500-15 ft. and 35 shots at 4,250 ft. in the Hunton put 200 ft. of oil in the hole in 1 hour. Shut in for 12 hours, it was opened and flowed a 30-bbl. head of oil. Acid treatment of 2,000 gal. and an oil load of 143 bbl. resulted in a flow of 184 bbl. of oil in 1½ hours, together with some 3,000,000 cu. ft. of gas. About the middle of the month the well was shut in for pipe-line connections.

Further tests, however, revealed a decline in production and only 9 bbl. was swabbed in 24 hours through tubing. The above perforations were cemented off and the hole plugged back to 4,344 ft. A test at 4,267-92 ft. showed nothing. Last perforations were at 4,245-59 ft., yielding salt water and the well was plugged.

Location of the well is 5 miles northeast of the Prague pool and 3 miles south of Paden. Previously, it was heralded as an important Hunton lime discovery, with an indicated potential of nearly 100 bbl. of oil an hour.

OKLAHOMA COMPLETIONS

Wildcats

Grady County: R. H. Roark 1 A. C. Cast, NW NE 25-3n-7w, dry, T.D. 5,011 ft., sand and shale to bottom, show oil 3,351 ft.
Jackson County: Lloyd Noble 1 Gregory, SE NW 36-1s-24w, dry, T.D. 7,504 ft., broken dolomite 2,560 ft., Cisco 3,120 ft., Canyon 4,150 ft., basal Bend lime 7,390 ft.
Lincoln County: Deep Rock 1 Argo, NW NE 4-16n-5e, dry, T.D. 4,514 ft., Viola 4,037 ft., sand 4,092 ft., Arbuckle 4,441 ft.
Okfuskee County: Mid-Continent 1 Reed, NW NW SE 30-12n-7e, dry, T.D. 4,556 ft., Bartlesville 3,150 ft., Hunton 4,256 ft., Viola 4,442 ft., Wilcox 4,508 ft., second Wilcox 4,533 ft.
Pottawatomie County: Watchorn 1 Rogers, SE SW SE 17-9n-5e, dry, T.D. 4,778 ft., Earlsboro 3,655 ft., Wilcox 4,349 ft., second Wilcox 4,441 ft.

Fields

Cumberland, Marshall County: Pure 2 Thompson-108, SE SW SE 21-5s-7e, flowed 182 bbl. in 4 hr., pay sand 5,854-5,948 ft., T.D. 5,966 ft.
Edmond, Northeast, Oklahoma County: Harper-Turner 1 Ives, SW NW 16-14n-2w, 2,000,000 cu. ft. gas, Bartlesville 5,746-48 ft.
Guthrie, Logan County: Continental 2 Metzger, NE SW NE 12-17n-2w, dry, T.D. 5,222 ft., Bartlesville 5,187 ft., shot 5,195-5,205 ft., 900 ft. of oil in the hole exhausted.
Isom Springs, Marshall County: Gill-Morse 3 Adams, SW NW SE 31-7s-6e, dry, T.D. 540 ft.
Knox, Grady County: John Graham et al 3 Cochran, NW SW SE 27-3n-5w, dry, T.D. 2,665 ft.
West Loco, Stephens County: J. E. Jackson 1 Massey, SW NE NW 8-3s-5w, pumped 10 bbl., sand 970-85 ft., T.D. 1,176 ft.
Osage City, Osage County: More No. 6, SW NW NW 35-22n-8e, pumped 50 bbl., Big lime 1,905 ft., T.D. 2,405 ft.
Otoe City, Noble County: O. C. Myers 1 Donahoe, W½ NE SE 16-22n-1e, flowed 30 bbl., Avant 3,003 ft., T.D. 3,075 ft.
Pauls Valley, Garvin County: Pure 1 H. B. Jackson, NW SE SW 31-4n-1e, flowed 136 bbl. in 4 hr., Wilcox 4,053-66 ft. (exception to spacing rule).

Miscellaneous

Okmulgee County: Fred Cusack 1-B Blackburn, NW SW 9-13n-14e, dry, T.D. 1,960 ft., Gilcrease 1,860 ft.
Osage County: Barnsdall No. 19, SW¼NW SW 17-23n-12e, pumped 5 bbl., sand 1,508 ft., T.D. 1,565 ft.
Sagamore No. 413, NW NE SW 21-28n-10e, 400,000 cu. ft. gas, sand 400-15 ft., T.D. 793 ft.
Pontotoc County: W. A. Delaney 1 Goodson, SW NW 26-5n-5e, pumped 149 bbl., Viola 2,520-70 ft.
Seminole County: Jordon Oil 1 Cohee, N½ NW NE 17-8n-8e, dry, T.D. 3,399 ft., Cromwell 3,220 ft.

NORTH CENTRAL TEXAS

Clay County Wildcat Has Oil Showing in Mississippian Lime

By W. D. THORN

WICHITA FALLS, Tex.—Good oil showing in a Clay County wildcat, from Mississippian lime, and gaging of two wildcat discoveries, one in Montague County, the other in Throckmorton County, attracted chief interest in North Texas last week.

Late last week L. S. Youngblood of Oklahoma City, and R. L. Foree of Dallas, Tex., 1 Sanzenbacher, Clay County wildcat, 4 miles southwest of Henrietta, in the middle of a Gulf Oil Corp. farmout block, was swabbing estimated 1 bbl. of new oil per hour after using initial acid treatment of 2,000 gal. through casing perforations at 5,995-6,045 ft., opposite the Mississippian lime, apparently assuring discovery of a new field.

Northwest of Illinois Bend and just south of the Red River, northern Montague County, R. C. Lipscomb et al 1 Vaughan, was completed pumping 150 bbl. of 29.5-gravity oil in 24 hours from Strawn sand at 3,860-65 ft. It opens a new and comparatively shallow field in an area where previous exploration has hinted thick sand bodies and prolific production might be obtained. This new discovery, although small, will warrant additional wildcatting in the vicinity.

Humble Oil 1 Mathews, Throckmorton County discovery well, in the A. Tartar Survey, pumped 84 bbl. of oil and 109 bbl. of water on 24-hour potential test, oil testing 42.3 gravity. The production is from Mississippian lime at total depth of 4,613 ft.

NORTH CENTRAL TEXAS COMPLETIONS

Wildcats

Archer County: W. T. Hutcheson, Jr., 1 N. J. Wood, Lot 11, Blk. 5, Clark & Plumb Sub., dry, T.D. 1,075 ft.
Whitaker Oil Co. 1 W. C. Frey, Sec. 16, P.P.C.S.L. Sur. A-339, dry, T.D. 4,411 ft.
White and Duncan 2 L. Kinder, Lot 96, Blk. 5, Clark & Plumb Subd., dry, T.D. 1,250 ft.
Montague County R. C. Lipscomb et al 1 E. E. Vaughn, W. C. Winters Sur., A-842, flowed 150 bbl., oil sand 3,859-65 ft., T.D. 4,982 ft., P.B. 4,982 ft. (Discovery well).
Throckmorton County: Humble O. & R. Co. 1 J. B. Mathews, Alvin Tarter Sur. A-824, pumped 85 bbl. oil and 100 bbl. water day, pay 4,597-4,611 ft., acid 3,000 gal., T.D. 4,611 ft. (Discovery well).

Fields

Scotland, Archer County: Roy Lee, Tr., 2 A. B. Edwards, Lot 24, Hunt Subd., location abandoned.
Shell Oil Co. 5 W. M. Coleman C, Lot 4, Sec. 73, A.T.N.C.L. Sur., flowed 32 bbl., acid 3,000 gal., pay 5,184 ft., T.D. 5,203ft.
Thornberry, Clay County: Metzner and Gorman 1 Taylor and Riley, J. Duncan Sur. A-112, dry, T.D. 1,190 ft.
Sid Taylor 2 Perkins & Cullum, Lot 38, Bacon Subd., dry, T.D. 1,115 ft.
Wilder Drilling Co. 1 Taylor-BB, Lot 33, Bacon Subd., pumped 12 bbl., pay 1,070 ft., T.D. 1,083 ft.
New York City, Clay County: Shell Oil 2 S. H. Anderson, Sec. 5, T.&N.O. Sur. A-678, flowed 2,496 bbl., pay 6,164 ft., acid 2,000 gal., T.D. 6,204 ft.
Mueller, Montague County: Continental Oil 1 Mrs. A. R. Richardson, W. B. Savage Sur., A-677, flowed 440 bbl., pay 7,184 ft., T.D. 7,259 ft.
Electra, Wichita County: Continental Oil 15 Waggoner-D, Sec. 33, Blk. 5, H.&T.C. Sur., dry, T.D. 510 ft.
Burkburnett, Wichita County: Martin Properties 2 L. F. Raming, Lot 2, H. Hastie Sur. A-92, dry, T.D. 1,325 ft.
K.M.A.-Ellenburger, Wichita County: E-C Oil Co. 34-E Mangold, Lot 33, P. Castleman Sur. A-35, flowed 470 bbl., pay 4,339 ft., acid 3,000 gal., T.D. 4,381 ft.
Rock Crossing, Wilbarger County: Phillips Pet. 8 Waggoner-OO, Sec. 47, Blk. 4, H.&T.C. Sur., potential 32 bbl., pay 1,888 ft., T.D. 1,895 ft.
Padgitt, Young County: Shell Oil 1 J. W. Bullock-B, Sec. 336, T.E.&L. Sur., dry, T.D. 4,959 ft.

TEXAS GULF COAST

Shallow Pool Opened Northwest Of Edna, Jackson County

By T. F. SMILEY

HOUSTON, Tex.—Another pool opener was recorded in Jackson County last week when Texas 2 O. D. Collier, 5 miles northwest of Edna, in the James Kerr Survey, was completed as a producer at 2,455 ft. The discovery had initial production of 202 bbl. through 11/64-in. choke, with tubing pressure of 290 lb., casing pressure 360 lb., shut-in, and gas-oil ratio of 56. Casing is perforated at 2,420-25 ft.

Broderick & Gordon 1 L. G. Lobit, wildcat test a mile northwest of Addicks in the David Middleton Survey, Harris County, was shut down for repairs at 5,910 ft., where it was drilling in shale. The hole topped the Discorbis at 3,575 ft., Heterostegina 3,575 ft., Textularia Warreni 5,267 ft., Hockleyensis 5,878 ft.

Harrison & Abercrombie 1 F. R. Betts, Jackson County wildcat in the George Sutherland Survey, was preparing to acidize. The well was killed at total depth of 5,030 ft. Casing was perforated at 4,986-97 ft. and squeezed. After drilling out to 4,997 ft. casing was perforated at 4,988-94 ft. Tubing was swung at 4,995 ft. The well was swabbed but would not flow.

Stanolind's test, 1 W. W. McCrory et al, on the east flank of the Harmon field in Jackson County, was showing nothing impressive. A drill-stem test at 5,355-85 ft. showed oily mud and 50 lb. pressure. The hole is down to 5,565 ft.

Pan American Production Co., which has had one wildcat under way, in the S. P. Middleton Survey, Wharton County, is getting ready to drill another. Both locations are in the North Louise area of the county. The new test, 1 Babcock, is 3,200 ft. east of the first one, the 1 Ekvall, which is reported dry.

John B. Coffee B-3 Martinez, a mile southeast of the West Mauritz field in Jackson County, is reported to have logged a new sand with an oil show at 5,400 ft., probably to be tested. The well, an outpost, missed the regular 5,460-ft. sand.

TEXAS GULF COAST COMPLETIONS

Wildcats

Jackson County: Texas 2 O. D. Collier, James Kerr Sur., 5 mi. NW of Edna, 202 bbl. through 11/64-in. choke, T.P. 290 lb., C.P. 360 lb., S.I. gas-oil ratio 56:1, T.D. 2,455 ft., *discovery*.

Renwar Oil Corp. 1 O. W. Freeman, William Menefee Sur. A-53, 2 mi. SW of Ganado, 115 bbl. through 9/64-in. choke, T.P. 1,920 lb., C.P. 2,500 lb., gas-oil ratio 5,800:1, T.D. 6,651 ft., P.B. 6,650 ft., *discovery*.

Fields

Barbers Hill, Chambers County: Sun 8 C.C.A.A., O.W.W.O., old T.D. 5,450 ft., new P.B. T.D. 5,055 ft., 26.70 bbl. on pump.

Sun 1-A Higgins, 65 bbl. on pump, T.D. 5,620 ft., P.B. 5,310 ft.

Texas Gulf Producing Co. 3 Mrs. A. D. Eberspacher, O.W.W.O., old T.D. 4,563 ft., drilled out to 5,055 T.D. 5,240 ft., placed on gas lift 23.45 bbl. through ⅛-in. choke.

Texas Gulf Producing Co. 2 J. M. Fitzgerald, O.W.W.O., T.D. 5,065 ft., P.B. 4,900 ft., 219 bbl. through 11/64-in. choke, input pressure 305 lb., C.P. sealed.

Texas Gulf Producing Co. 2 Fitzgerald-Meadows, O.W.W.O., old T.D. 4,563 ft., drilled out o 5,055 ft., P.B. 4,118 ft., 97.94 bbl. through ¼-in. choke on gas lift, with input pressure 490 lb.

Texas Gulf Producing Co. 11-A Kirby Petroleum Co., O.W.W.O., old T.D. 6,288 ft., drilled out to P.B. T.D. 5,552 ft., 39.25 bbl. on gas lift, with input pressure 500 lb., gas-oil ratio 489:1.

Texas Gulf Producing Co. 22-B Kirby Petroleum Co., O.W.W.O., old T.D. 5,107 ft., new P.B. T.D. 4,245 ft., 35.8 bbl. on pump.

Texas Gulf Producing Co. 5 T. H. McLean, O.W.D.D., old T.D. 4,060 ft., deepened to 4,628 ft., P.B. 3,851 ft., 60.6 bbl. on pump.

Texas Gulf Producing Co. 2 D. W. Scott, O.W.W.O., old T.D. 7,697 ft., cleaned out to P.B. T.D. 2,120 ft., drilled to new T.D. 2,505 ft., dry and abandoned.

Texas Gulf Producing Co. 7 J. F. Welburn, O.W.D.D., old T.D. 5,635 ft., old P.B. T.D. 4,162 ft., new T.D. 5,550 ft., new P.B. T.D. 5,350 ft., 232.44 bbl. through 5/32-in. choke, T.P. 655 lb., C.P. 900 lb., gas-oil ratio 240:1.

Texas Gulf Producing Co. 10 K. Winfree, O.W.W.O., old T.D. 5,615 ft., new T.D. 5,467 ft., 209.41 bbl. through ¼-in. choke, T.P. 280-350 lb., C.P. 450 lb. S.I., gas-oil ratio 196:1.

Bailey's Prairie, Brazoria County: Glenn McCarthy 2 W. B. Munson, dry at 11,361 ft.

Esperson, Liberty County: H. A. Welch and General Crude Oil Co. 2 fee, dry at 9,976 ft.

Garwood, Colorado County: W. R. Davis & Co. 1 H. C. Carpenter, dry at 6,100 ft.

Hardin, Liberty County: Gulf 2 A. B. Tullos, O.W.W.O., old T.D. 7,633 ft., P.B. 7,630 ft., washed, 26 bbl. with no pressure.

Smith & McDannald 3 G. S. Rives, O.W.W.O., old T.D. 7,645 ft., P.B. and cleaned to 7,629 ft., 104.79 bbl. through 8/64-in. choke, T.P. 275 lb., C.P. 1,479 lb., S.I., gas-oil ratio 640:1.

Hull, Liberty County: American Republics Corp. 154 Dolbear, O.W.D.D., old T.D. 2,520 ft., new T.D. 2,770 ft., 128 bbl. on pump.

Gulf 21 E. M. Scarborough, O.W.W.O., old T.D. 6,015 ft., new P.B. T.D. 5,800 ft., 48 bbl. on pump.

Lovell's Lake, Jefferson County: Humble 3-B B. A. Steinhagen, O.W.W.O., old T.D. 7,833 ft., P.B. 7,785 ft., 120 bbl. through ⅛-in. choke, T.P. 1,550 lb., C.P. sealed, gas-oil ratio 4,540:1.

Maurbro, Jackson County: Humble 5 A. Gayle, 562 bbl. through ¼-in. choke, T.P. 500 lb., C.P. 500 lb., gas-oil ratio 284:1, T.D. 5,218 ft.

North La Ward, Jackson County: Amerada 1 J. A. Graves, 75 bbl. through ¼-in. choke, T.P. 600 lb., C.P. 900 lb., S.I., gas-oil ratio 225:1, T.D. 5,227 ft.

Red Fish Reef, Chambers County: Humble 8A-223 State, O.W.W.O., old T.D. 10,924 ft., P.B. 8,730 ft., 7.25 bbl. through ⅛-in. choke, T.P. 1,450 lb., C.P. sealed, gas-oil ratio 625:1.

SOUTHWEST TEXAS

Testing Continues at New Well in Poth Field

By T. F. SMILEY

CORPUS CHRISTI, Tex.—Preparations for a further test of Superior Oil Corp. 1 G. J. Groos, second well for the Poth field in Wilson County, were under way as the week closed. This well, which has not yielded clear evidence as to whether it is going to record a new producer in that area, was allowed to stand several days after reaching a depth of 4,324 ft. and undergoing cleaning. Bailing then was resumed and the fluid was encountered 726 ft. from bottom. After 9¼ bbl. of oil had been raised from the hole, the well bailed 50 per cent oil and 50 per cent water, with the fluid level at 500 ft. Fluid was coming into the hole at the rate of 40 bbl. every 12 hours and the proportion of water was increasing. The well was bailed completely dry and let stand 4 hours. It then bailed 13 gal of oil and 14 gal. of water. Preparations for acidization and another test were begun.

Humble 1 A. C. Soechting, a wildcat in the Peter McGreal Survey of Atascosa County, was shut down for orders after coring 7,585-89 ft. and recovering fragments of tight Edwards lime. A 41-minute drill-stem test at that depth, with ¾-in. bottom-hole choke open on top, showed no pressure. A 41-minute test at 7,575-83 ft. had recovered 160 ft. of mud with slight show of oil.

In the Lower Gulf Coast territory Auld, Carter & Coquat have derrick up for a wildcat Wilcox test, 1 Schorre Brothers, in the Carlos Martinez Survey of De Witt County, 5 miles south of Runge. Location for a Wilcox test, 1-W Otto von Roeder, has been staked by American Liberty Oil Co. a mile east of Burnell, in the James Johnson Survey, Karnes County.

SOUTH TEXAS COMPLETIONS

Wildcats

Duval County: Magnolia 1 D.C.R.C., Sur. 305, dry at 2,995 ft.

Fields

Aviator, Webb County: Dulup Oil Co. 1 Puig, dry at 1,938 ft.

Driscoll, Duval County: Continental 83-A Clara Driscoll, 119 bbl. oil and 25 bbl. salt water through ¼-in. choke, T.P. 200 lb., C.P. 900 lb., gas-oil ratio 262, T.D. 3,371 ft.

Garcia, Starr County: Sun 2-B Frost National Bank, 144 bbl. through 9/64-in. choke, T.P. 670 lb., C.P. 770 lb., gas-oil ratio 387, T.D. 3,754 ft.

North Sun, Starr County: Sun 1-B S. Rodriguez, dry at 5,858 ft.

Oakville, Live Oak County: Henderson Coquat 1 Oakville School Land and S. Reagan, 46 bbl. through 7/32-in. choke, T.P. 938 lb., C.P. 1,055 lb., gas-oil ratio 20,143, T.D. 2,775 ft.

Rincon, Starr County: Humble 2 San Antonio Loan & Trust Co., 75 bbl. through ¼-in. choke, T.P. 320 lb., C.P. 0 lb., gas-oil ratio 620.

Humble 3 San Antonio Loan & Trust Co., 82 bbl. through 9/64-in. choke, T.P. 350 lb., C.P. 850 lb., gas-oil ratio 100, T.D. 4,282 ft.

SOUTH CENTRAL TEXAS COMPLETIONS

Wildcats

Gonzales County: Texharvey Oil Co. 1 Ura D. Lord, J. R. Hubert Sur., dry at 6,615 ft.

Williamson County: H. C. Le Fors 1 Annie M. Pfluger, W. S. Parker Sur., dry at 810 ft.

Lentz, Bastrop County: H. F. Clayton 1 O. B. Lentz, dry at 2,295 ft.

LOWER GULF COAST COMPLETIONS

Wildcats

Cameron County: Standard of Texas and Shell 1 M. Fredericks, dry at 9,003 ft.

Refugio County: P. R. Rutherford 1-F P. H. Fagan, Mary Byrne Sur., no important shows, dry at 6,515 ft.

Fields

Baldwin, Nueces County: Magnolia 1 S. D., M. L. Sanders, finished as salt-water disposal well.

Quinto Creek, Jim Wells County: Kilgore Developers 1-A Weldon, Stacy & Blake, dry at 5,900 ft.

Saxet, Nueces County: Phillips 1 K. Hutchins, O.W.W.D., T.D. 4,752 ft., P.B. 4,500 ft., 18,000,000 cu. ft. dry gas, open flow.

Seeligson, Jim Wells County: Shell 15 L. Seeligson, 151 bbl. through 7/64-in. choke, T.P. 1,200 lb., C.P. 1,125 ft., gas-oil ratio 41, T.D. 6,060 ft.

Sun 16 P. Canales, 130 bbl. through 7/64-in. choke, T.P. 1,025 lb., C.P. sealed, T.P. 6,002 ft.

South Caesar, Bee County: Continental 3 M. T. Fox, 138 bbl. through ⅛-in. choke, T.P. 1,760 lb., C.P. 2,280 lb., gas-oil ratio 1,300.

Stratton, Jim Wells County: S. E. Wilson and Gulf Plains Corp. 3-A San Antonio Joint Stock Bank, est. 40,000,000 cu. ft. gas, S.I. since completion April 20, 1942.

EASTERN TEXAS FIELDS

Casing Set to Test Paluxy Sand In Wood County Wildcat

By W. D. THORN

DALLAS, Tex.—East Texas wildcat operations last week resulted in several Woodbine sand failures, with chief interest in the district still held by Delta Drilling Co. et al 1 Goldsmith, Wood County wildcat. This potential discovery well has cemented oil string of casing at 6,455 ft., with total depth 6,504 ft. Electrical survey of the hole indicated 32 ft. of net oil sand in the Paluxy formation topped at 6,258 ft. It was scheduled to start perforating casing for a production test. Magnolia 1 McCreight, wildcat about 4 miles northwest of the Delta well, was drilling below 4,900 ft. with no shows found in the Woodbine sand.

Delta Drilling Co. et al 1 Gentry, deep test southwest of Athens, Henderson County, stopped drilling at total depth of 8,704 ft. and plugged back to 7,930 ft. to make a drill-stem test in the Rodessa section before plugging to abandon. Bobby Manziel et al 1-B Levine, north of Trinidad, Henderson County, shut down for orders at total depth 3,950 ft., with no shows in the Woodbine. It was Manziel et al's third unsuccessful attempt to find Woodbine production in that area.

Southern Production Co. 1 Lambert, in the Joaquin field, Shelby County, has been completed as a gas well, rating 87,000,000 cu. ft. daily. Several weeks ago it made an appreciable amount of oil from a thin stringer of oil sand, but was unable to prevent early intrusion of water with the oil.

EAST TEXAS COMPLETIONS

Wildcats

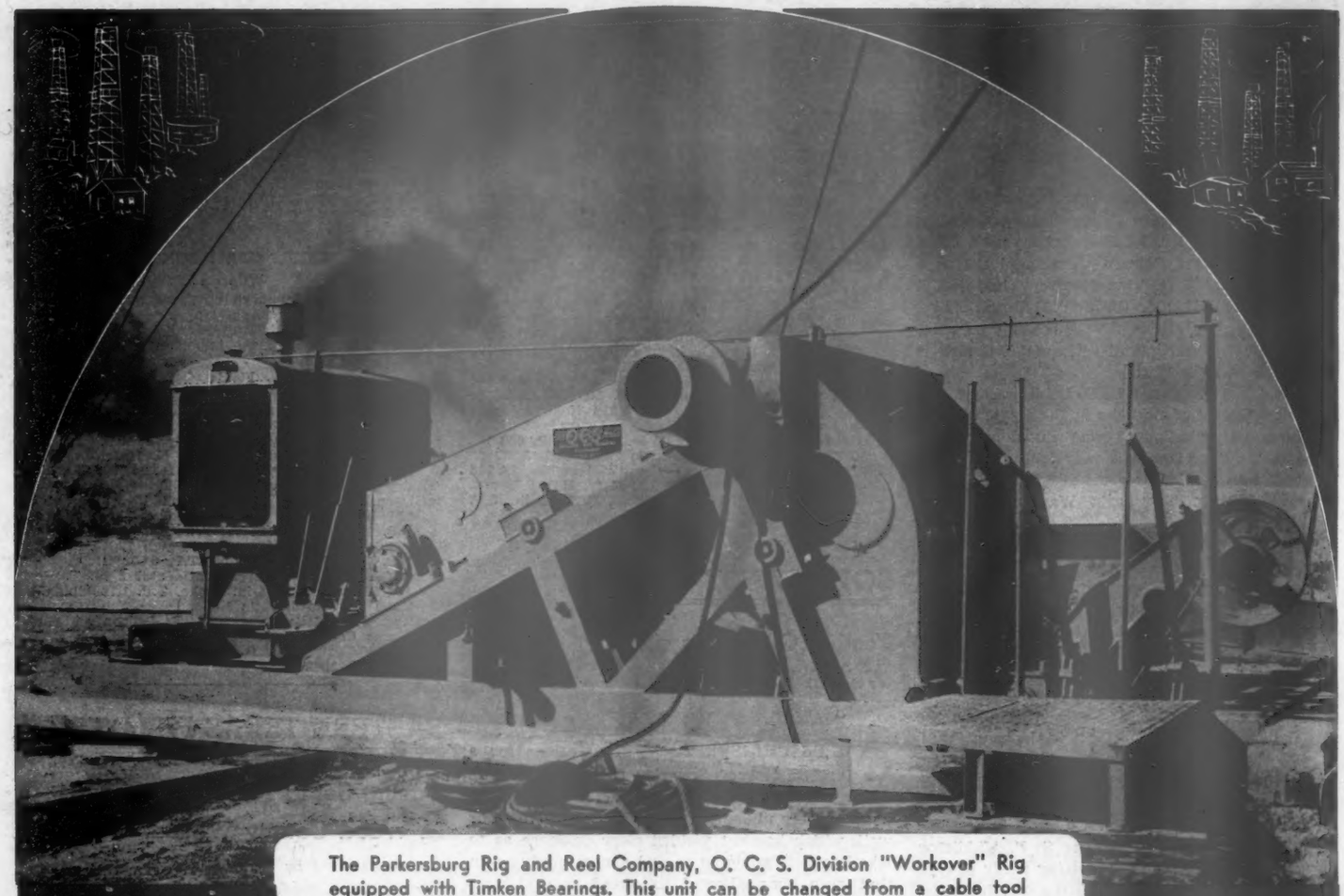
Kaufman County: Martin-Milton et al 1 Rutland Savings Bank, John Baker Sur., 3 mi. SE of Kemp, dry, T.D. 3,190 ft., in salt water sand.

Fields

Hawkins, Wood County: Humble 4 B. C. Wyatt, William Herrington Sur., flowed 129 bbl. through ¼-in. choke, 25.8-gravity, T.D. 4,883 ft.

Texas Co. 2 J. O. Cobb, H. F. Robinson Sur., pumped 106 bbl., 8 to 14 per cent salt water, 20-gravity, perf. casing 4,768-96 ft., T.D. 4,837 ft.

Joaquin, Shelby County: Southern Prod. Co. 1 Mrs. S. E. Lambert, S. O. Pennington Sur., gaged 86,000,000 cu. ft. gas, R.P. 2,170 lb., T.D. 5,161 ft.



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ILLINOIS FIELD REPORT

Jefferson County Outpost Testing Three Sands

MATTOON, Ill.—Texas Co. 1 Baker, SW SE NE 33-3s-3e, in the new field south of the State Game Farm in Jefferson County, last week loomed as a producer from three pays. Following an acid treatment in the McClosky lime, operators swabbed the well for 195 bbl. of oil in 24 hours, with production coming from the Aux Vases sand and the Levias and McClosky limes. Operators will place the well on pump and may shoot the well in the Aux Vases sand before completion.

A water-bearing St. Peter sand has been encountered by the Paul S. Pritchard 1 James T. Holliday, SE NE SW 31-2n-7w, St. Clair County wildcat. After failure to find a show of oil in this formation the well was shut down on orders. It is reported that the well may be plugged back to the Trenton lime for further work. No. 1 Holliday was formerly a Trenton test and had encountered a large section of saturation in that formation. The well failed to make a commercial producer, however, even after acid treatment and was deepened to test the St. Peter.

In the Bluford area of Jefferson County, Lario Oil & Gas Co. has set casing to test the McClosky lime at 3,012-16 ft. in the 1 Mountain-Mateer, N½ NW SE 36-2s-4e. The test is located northeast of production in the Bluford field and, if successfully completed, will extend the field a short distance in that direction.

ILLINOIS COMPLETIONS

Wildcats

Coles County: W. L. Topf 1 Kinsel, SE SE SW 20-14n-10e, dry at 515 ft.

Edgar County: Ingram et al 1 Hanner, SW SW SW 4-13n-14w, dry at 401 ft.

Gallatin County: Vanderbark 1 Browning, NE NW SE 10-8s-10e, dry at 2,841 ft.

Marion County: Ben Taylor 1 Garrett, NE NE 24-4n-2e, dry at 2,262 ft., Cpyress 1,835 ft., Fredonia 2,153 ft.

Perry County: J. N. Harch 1 Branke, NE SE SE 3-4s-2w, dry at 1,343 ft., Aux Vases 1,340 ft.

Wabash County: Skiles et al 1 Aborn, SE NW NE 3-1s-13w, dry at 2,622 ft., Aux Vases 2,494 ft., Ste. Genevieve 2,528 ft.

W. E. Ballor 1 Michael, NE SE SE 27-1n-13w, pumped 155 bbl., T.D. 1,763 ft.

Wayne County: N. V. Duncan 1 Harris, NE NE SW 8-1s-7e, dry at 3,314 ft., Aux Vases 3,152 ft., Ste. Genevieve 3,219 ft.

H. Weinert 1 Davies, SW SE NE 6-3s-8e, dry at 3,540 ft., McClosky 3,446 ft.

White County: A. H. Anderson 2-A Leathers, NE NE SE 12-4s-10e, dry at 3,219 ft., Aux Vases 3,051 ft., Ste. Genevieve 3,090 ft.

Greer-Johnson 1 Aud, SE NW SE 27-6s-9e, dry at 89 ft., sand 70 ft.

Fields

Allendale, Wabash County: C. Kniepp 1 H. Price, SW SE NE 14-1n-12w, pumped 55 bbl., Biehl 1,428-1,510 ft., T.D. 1,510 ft.

Bible Grove, Clay County: Texas 3 Landwehr, NW SE NW 9-5n-7e, dry at 2,927 ft., Aux Vases 2,713 ft., Ste. Genevieve 2,775 ft.

Blairsville, Hamilton County: Walter Duncan 1 Thompson, SW NE SE 20-4s-7e, pumped 250 bbl., 20-qt. shot, Aux Vases 3,294 ft., T.D. 3,311 ft.

Cordes, Washington County: Glenwood 1 Dennis, SE SW SE 14-3s-3w, pumped 30 bbl., 20-qt. shot, Benoist 1,245 ft., T.D. 1,268 ft.

Covington, Wayne County: Deep Rock 1 Cravins-Craig, E½ E½ SE 30-1s-7e, pumped 146 bbl., 5,000 gal. acid, reacidized 2,000 gal., McClosky 3,211 ft., T.D. 3,225 ft.

East Inman, Gallatin County: Cherry & Kidd 8 Kerwin, NW SE SW 11-8s-10e, pumped 115 bbl., 20-qt. shot, sand 2,039-53 ft., T.D. 2,057 ft.

Carter 2 Busiek, NW NW SE 11-8s-10e, pumped 62 bbl., 30-qt. shot 2,047-62 ft., sand 2,039 ft., T.D. 2,062 ft.

Grayville, White County: S. C. Yingling 1 Reeves-Bretz, SE SW SW 20-3s-14w, pumped 41 bbl. oil and 40 bbl. water, Biehl 1,854-63 ft., T.D. 1,863 ft.

Griffin, Wabash County: W. W. Gray 36-A fee, N½ N½ SW 14-3s-14w, pumped 55 bbl., Benoist sand 2,641-56 ft., 60-qt. shot, T.D. 2,656 ft.

Iola, Clay County: Luttrell et al 1 Reed, SE NW NE 15-5n-5e, pumped 82 bbl., Benoist 2,292 ft., T.D. 2,306 ft.

Irvington, Washington County: Magnolia 7-C Koelling, NE SW NE 15-1s-1w, pumped 31 bbl., 15-qt. shot, Benoist 1,535-38 ft., T.D. 1,538 ft.

Keensburg, Wabash County: Navajo Oil 6 Gray, NE NW SE 30-2s-13w, pumped 50 bbl., Biehl 1,796-1,817 ft., T.D. 2,474 ft.

Louden, Fayette County: Carter 4 Rhedemeyer, NE NW SE 3-8n-3e, flowed 36 bbl., 15-qt. shot 1,569-74 ft., 30-qt. shot 1,461-75 ft., Weller 1,454 ft., T.D. 1,574 ft.

Carter 3-8 Rhedemeyer, SE NW SE 3-8n-3e, gas input well, T.D. 1,610 ft.

Vetsch & Thompson 2 Eagleton, NE NE SE 20-8n-3e, dry at 1,505 ft., Cypress sand 1,495 ft.

New Harmony, White County: Sun Oil 5-B Ford, NE SW NE 21-4s-14w, pumped 125 bbl., 40-qt. shot 2,707-28 ft., Bethel 2,700 ft., T.D. 2,970 ft.

Tide Water 14 Bacon, E½ W½ NE 5-5s-14w, pumped 23 bbl., Aux Vases 2,854-73 ft., 60-qt. shot 2,853-78 ft., T.D. 2,879 ft.

Noble, Richland County: Pure 1 Hill, NE SE 9-3n-9e, dry at 2,650 ft., Weller 2,596 ft.

Pure 1 Harry Hegg, NW SW 10-3n-9e, dry at 3,050 ft., McClosky 2,974 ft.

Pure 1 Hunt, NE NW 10-3n-9e, pumped 10 bbl., Weller 2,573 ft., T.D. 2,581 ft.

Shaffer et al 1 Boley, S½ NW NW 33-4n-9e, dry at 3,002 ft., Weller 2,633 ft., Ste. Genevieve 2,948 ft.

Phillipstown, White County: Jarvis & Marcell 1 Spencer, SW SE SW 31-4s-11e, pumped 105 bbl., sand 2,294 ft., 2,341-49 ft., T.D. 2,357 ft.

Roland, White County: Sinclair 13 McGee, NW NE SW 1-7s-8e, pumped 105 bbl., 5-qt. shot 2,240-44 ft., T.D. 2,246 ft.

St. Paul, Fayette County: Homer Luttrell 4 Ford, NE NW NW 31-5n-3e, pumped 78 bbl., Benoist 1,895-1,902 ft., 5-qt. shot, T.D. 1,902 ft.

South Lawrence, Lawrence County: Smith & Nye 2-B Spidel, NE SW SE 23-2n-12w, pumped 100 bbl., Biehl 1,350-88 ft., T.D. 1,388 ft.

South Mason, Effingham County: Luttrell 2 See est., SW NW NE 34-6n-5e, pumped 73 bbl., ripped casing 2,256-62 ft. in Benoist sand, T.D. 2,335 ft.

KANSAS, NEBRASKA

New Pool Opened Between Sellers and Beaver Fields

By CARL HOOT

A NEW Barton County pool was opened last week when N. Appleman et al 1 Stull, S½ SE SW 6-16-12w, flowed initial potential of 408 bbl. of oil a day from the Lansing-Kansas City lime series. Drilled to 3,331 ft., 5-in. casing was set at 3,179 ft. and then ripped from 3,118-30 ft. First acid treatment recovered 2 bbl. of oil an hour. A second and third treatment of 2,000 and 3,000 gal. boosted the flow to an estimated 100 bbl. an hour for 4 hours and then 40 bbl. an hour. Lansing lime was topped at 3,041 ft. with a light stain at 3,042-46 ft., saturation at 3,066-74 ft. and additional shows at 3,109-13 ft. and 3,120-30 ft.

Location of the well is midway between the Sellens pool of Russell County and the Beaver pool of Barton County. The pay zone at the new well is on approximately the same level as the two pools and will open the intervening space of 4 miles for additional drilling.

KANSAS COMPLETIONS

Barton County: Ramsey Pet. 1 Heinz, SE SW SE 4-18-11w, dry, T.D. 3,370 ft., Lansing 3,020 ft., conglomerate 3,277 ft., Arbuckle 3,335 ft.

Butler County: Adair & Morton 1 Pattison, SE SE NW 10-26-6e, dry, T.D. 3,175 ft., Lansing 1,785 ft., Mississippi lime 2,748 ft., Viola 3,147 ft., Simpson sand 3,168 ft.

Cowley County: Wolf Creek Oil 1 Hawley, SW SE 9-35-4e, dry, T.D. 3,361 ft., Layton sand 2,495 ft., Mississippi lime 3,300 ft., slight show oil 3,334-39 ft.

Graham County, 6 mi. N and W of Morel: R. W. Shields et al 1 Arbuthnot, NE NE NE 18-8-21w, dry, T.D. 3,635 ft., Lansing 3,249 ft., conglomerate 3,592 ft., Arbuckle 3,601 ft.

Greenwood County: K. T. Wiedemann 1 Stewart, NE SE 12-27-8e, dry, T.D. 2,791 ft., Mississippi lime 2,43 ft., Wilcox 2,783 ft., Arbuckle 2,789 ft., show oil 1,810 ft.

McPherson County: Globe Oil & Ref. 1 Anderson, SW SW SW 22-17-3w, dry, T.D. 3,728 ft., Mississippi lime 2,979 ft., Viola 3,494 ft., Simpson sand 3,623 ft., Arbuckle 3,692 ft.

Norton County: Helmerich & Payne 1 Paxton, NE SW 10-4-24w, dry, T.D. 3,983 ft., Lansing 3,606 ft., conglomerate 3,898 ft., Arbuckle 3,909 ft., Lamotte sand 3,928 ft., granite 3,936 ft.

Rush County: Continental 1 Munch, NW NE NE 9-16-19w, dry, T.D. 3,680 ft., Lansing 3,367 ft., Lamotte sand 3,670 ft.

Saline County: Auto Ordnance 1 Ruch, SE NE NW 25-13-2w, dry, T.D. 3,320 ft., Lansing 2,050 ft., Mississippi lime 2,537 ft., Hunton 2,913 ft., Viola 3,127 ft., Simpson sand 3,279 ft., Arbuckle 3,310 ft., show oil 3,281 ft.

Fields

Beaumont, Greenwood County: K. T. Wiedemann 19-A Lewis, SW NE 35-27-8e, dry, T.D. 2,728 ft.

(Continued on Page 89)

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CALIFORNIA FIELD REPORT

Strand Field May Be Extended One Mile Eastward

By L. P. STOCKMAN

LOS ANGELES, Calif.—Tide Water Associated Oil Co. is expected to extend the eastern limits of production in the Strand field of Kern County within another week or 10 days if the sand found in 56-8 Kern County Land in 8-30s-26e proves as good on a production test as it looks on visible inspection. This outpost is bottomed in oil sand and shale in the probable equivalent of the Stevens zone of Miocene age at 8,187 ft. A string of 7-in. casing was cemented a few days ago and preparations are now under way to complete in the conventional manner. Approximately 89 ft. of formation will be open to production but this interval is not all oil sand as there is considerable shale present. The Strand field has only been of secondary importance from a production standpoint and this new extension well may improve the outlook for future production. Up to the end of October the Strand field has only produced 1,549,187 bbl. of crude oil and current production has been averaging around 1,000 bbl. per day from nine wells drilled by Tide Water Associated Oil Co. and five completed wells of Shell Oil Co. The Stevens zone in this field is quite tight and in addition the productivity of the sand varies between locations.

Northern Gas Fields

Gas wells in the San Francisco Bay region are going on production in increasing numbers and within another couple of weeks will be in full operation. Rio Vista gas field has been on limited production all year, but with this field expected to take care of the smaller amount of natural gas flowing north from San Joaquin Valley fields due to conversion of the Stanpac gas line to crude oil all wells will be opened up to maximum capacity in the near future. Rio Vista has never been permitted to produce freely and for this reason it will be interesting to watch reservoir pressures after the field has gone through the current winter period on commercial production for the first time. This is by far the best gas field in the state both from an areal extent and volume standpoint and much is expected of it. Peter Cook is testing his second well in the Rio Vista gas field and it should be ready for final determination shortly. This gas well is bottomed at 4,351 ft. and has been plugged back to 4,220 ft. It has not shown up as Cook's initial well in this field and there might be some question as to whether it will prove commercially productive. Up in the Willows gas field of Glenn County, Ohio Oil Co. is completing 1 Willows Block A in 18-20n-2w following conclusion of drilling operations at 3,300 ft. On a formation test at 3,240-3,300 ft. this potential gas well flowed at a daily rate of 1,150,000 cu. ft. through a 32/64-in. bean. Actual drilling is being done by the Bender Drilling Co. There has been very little drilling in gas fields this year as most operators probably feel ample gas supplies have been found to meet normal demand. Wildcat exploration is, however, being carried on in search of new gas fields. The limitation on gas fields of one well to not less than 640 acres has obviously resulted in an almost complete stoppage of drilling in proved fields. In the Suisun district at the east end of Suisun Bay in Solano County, Standard Oil Co. has plugged back 2-1 Suisun from 7,300 ft. to 6,693 ft. following the locating of water entry at 6,785-90 ft. and 6,890-80 ft. This potential gas well looked good for a time but considerable difficulty has been experienced in getting it on production. Standard has moved northwest of this wildcat and will drill a test on the Fontana property in 23-3n-1w. Further northwest the company has 1-2 Suisun in 35-4n-2w making hole at 6,007 ft.

SAN JOAQUIN VALLEY COMPLETIONS

Belridge, South, Kern County: Belridge Oil Co. 37-33 fee, 33-28s-21e, pumped 40 bbl., 14.9-gravity, 20 per cent cut, T.D. 800 ft., 100-mesh perf. 580-800 ft., completed in upper Belridge zone of Pleistocene age.

Belridge Oil Co. 37-33-A fee, 33-28s-21e, pumped 20 bbl., 13.2-gravity, 20 per cent cut, T.D. 820 ft., 100-mesh perf. 589-820 ft., completed in upper Belridge zone of Pleistocene age.

Belridge Oil Co. 47-33 fee, 33-28s-21e, pumped 75 bbl., 16.1-gravity, 15 per cent cut, T.D. 775 ft., perf. 424-775 ft., completed in upper Belridge zone of Pleistocene age.

Belridge Oil Co. 77-33 fee, 33-28s-21e, pumped 30 bbl., 17.6-gravity, 25 per cent cut, T.D. 750 ft., P.B. 578 ft., 120-mesh perf. 413-578 ft., completed in upper Belridge zone of Pleistocene age.

Belridge Oil Co. 47-34-A fee, 34-28s-21e, pumped 32 bbl., 15.9-gravity, 50 per cent cut, T.D. 765 ft., 120-mesh perf. 625-765 ft., completed in upper Belridge zone of Pleistocene age.

Coalinga, West, Fresno County: Standard Oil Co., 113-13-D fee, 13-20s-14e, pumped 49 bbl., 20.7-gravity oil and 16 bbl. water, T.D. 1,510 ft., 60-mesh perf. 1,041-1,500 ft., completed in Temblor zone of Miocene age.

Helm, Fresno County: Amerada Petroleum Corp. 35-27 Weyant, 27-16s-17e, flowed 310 bbl., 30.6-gravity, 1 per cent cut, 211,000 cu. ft. gas, 24/64-in. bean, pressures 175/850 lb., T.D. 8,300 ft., P.B. 8,160 ft., completed in lower zone of Miocene age.

Kern River Front, Kern County: Standard Oil Co. 7-8 fee, 8-28s-27e, pumped 128 bbl., 14-gravity oil and 25 bbl. water, T.D. 2,865 ft., 60-mesh perf. 2,650-2,768 ft., 2,828-63 ft., M point 2,461 ft., N point 2,579 ft., Q point 2,652 ft., completed in Tegeler zone of Pliocene age.

Westates Petroleum Corp. 38 Cauley, 16-28s-27e, pumped 105 bbl., 15-gravity, 0.2 per cent cut, T.D. 2,926 ft., 125-mesh perf. 2,897-2,926 ft., M point 2,558 ft., N point 2,684 ft., completed in Tegeler zone of Pliocene age.

Midway-Sunset, Kern County: H. & T. Oil Co. 7 Midway, 15-31s-22e, pumped 25 bbl., 13-gravity, 8 per cent cut, T.D. 1,050 ft., P.B. 1,000 ft., completed in upper zone of Pliocene age.

Mount Poso, Kern County: Chanslor-Canfield Midway Oil Co. 9 Mon, 26-27s-28e, pumped 55 bbl., 15.1-gravity, 20 per cent cut, T.D. 1,503 ft., perf. 1,444-1,503 ft., completed in Vedder zone of Miocene age.

Riverdale, Fresno County: Amerada Petroleum Corp. 72-22 Clemente, 22-17s-19e, flowed 222 bbl., 38.6-gravity, 0.3 per cent cut, 2,240,000 cu. ft. gas, 11/64-in. bean, pressures 890/590 lb., T.D. 6,900 ft., perf. 6,775-6,805 ft., completed in Lawton zone of Miocene age.

Test of Aliso Canyon Well Indicates Large Producer

Tide Water Associated Oil Co. will probably have an excellent flowing well in the Aliso Canyou field of Los Angeles County in the coastal district segregation within another few days as 1 Sesnon on a formation test several days ago flowed at a daily rate of 2,100 bbl. of relatively clean 23-gravity oil and 1,500,000 cu. ft. gas from 8,487-9,075 ft. This well, which failed to produce oil in the upper zone, now looks like an excellent prospect for large production. This well made considerable gas in the upper zone but since the company wanted crude-oil production the well was deepened to its present depth, 9,086 ft. Liner has been run and landed at 9,081 ft. and the well is being bailed at the present time. Aliso Canyon field was discovered by Tide Water Associated Oil Co. and it now looks like a major discovery although other operators have been unable to secure close enough acreage to get production.

Tide Water Associated Oil Co. is still working with 1 Davis in the Gato Ridge district of Santa Barbara County in 33-8n-31w, but the outlook for commercial production does not look any too hot. After pumping in 37 bbl. of distillate the company was able to pump out 300 bbl. of fluid in 24 hours. This fluid cut 35 per cent water and mud, the balance being 11.7-gravity oil. This tar zone appears promising but the fluid is too thick and viscous to flow into the well bore to be pumped out. As the gravity indicates the oil is very heavy but at 5,956 ft. it will take a lot more oil than has been recovered to pay out the cost of drilling.

(Continued on Page 79)

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ROCKY MOUNTAIN AREA

New Tensleep Oil Field Opened In Park County, Wyoming

By T. R. INGRAM

DENVER, Colo. — Wyoming scored again the past week with the discovery of a new black-oil field in the Tensleep horizon at Elk basin in Park County in the Minnelusa Oil Corp. 1 E. T. Henderson, NE NE NE 31-58n-99w, a joint operation with the Yale Oil Corp. Although figures are not yet available as to what the well will do in the way of initial production pending a test, the indications are that it will prove to be a major development. Unofficial information is to the effect that when the plug was drilled the well started flowing 125 bbl. per hour. R. S. Shannon, president of the Minnelusa corporation, was at the well superintending the test which was expected to take place within a few days.

Preliminary information is that the top of the Embar was reached at 4,463 ft. and showed some saturation. The drill then entered the Tensleep at 4,488 ft. and more than 50 ft. of saturation was cored. The 5-in. was set at 4,497 ft. The location of the well is nearly 2 miles southeast of the center of the field in an area that shows considerable faulting and is a mile north of a gas well completed a year ago for 3,000,000 cu. ft. in the Dakota sand by the MacKinnie Oil & Drilling Co. Elk Basin is one of the older Wyoming fields, having been discovered in 1915, since which time it has produced more than 11,000,000 bbl., mostly light oil of 43 gravity from the Frontier sands at around 1,500 ft. Seven gas wells have been completed in the Dakota, one of which made 90,000,000 cu. ft. initial production, this being the lowest horizon tested up to this time. Part of the field lies in southern Montana. The Ohio Oil Co. is a large operator in the field. Continental Oil Co. has extensive holdings which were acquired in a trade several years ago with the old Midwest interests for holdings in the Cat Creek field in Montana. Minnelusa has extensive interests resulting from a consolidation of the holdings of several smaller companies. MacKinnie Oil & Drilling Co. has some 1,500 acres lying to the south of the well, its nearest being 40 acres diagonally offsetting the discovery.

Cut Bank Field

One of the largest deals in oil properties in the Rocky Mountain area in a number of years was reported this week in the sale to the Standard Oil Co. of New Jersey of the properties of the Santa Rita Oil & Gas Co. and the Northwest Refining Co. in the Cut Bank field in Montana. Cut Bank, which was discovered in 1932, is the largest producing field in area in the Rocky Mountain district and comprises approximately 93,000 acres of proven territory of which 38,000 is classed as oil and 55,000 as gas. Production of oil up to the end of 1941 was approximately 26,000,000 bbl. The Glacier Production Co., a subsidiary of the Montana Power Co., is the largest operator in the field in quantity of production, the Texas Co. being second and Santa Rita third. They are substantially on the same relative basis as to acreage. These three companies each control approximately 20 per cent of the total acreage and a number of smaller interests control the remaining 40 per cent. The Santa Rita is an outgrowth of development by L. B. (Tip) O'Neal, a pioneer in the field, and he and his family control both the oil and refining companies. The Northwest, however, is operated as a separate organization, the plant having a capacity of 3,000 bbl. daily and 750 bbl. cracking capacity.

The Notches field in Natrona County, Wyoming, a black-oil producer in the Tensleep which has been shut in for a number of years after three wells were completed, is again on production. The Trigood Oil Co. (Goodstein interests) this week completed its 3 Government for 300 bbl. on a swabbing test.

Wildcats continue to be shut down for the winter. The General Petroleum test at Gooseberry Creek, Wyo., and the Superior Oil Co. 1 Brimmer at Bunker Hill were added to the list the past week.

COLORADO COMPLETIONS

Yellowjacket-Buford district, Rio Blanco County: Buford Oil Co. 1 Government, C SW SW 16-1n-91w, dry, T.D. 4,527 ft. in Madison lime.

WYOMING COMPLETIONS

Lance Creek, Niobrara County: Continental Oil Co. 9 Rodeo-4, SE NW NE 35-36n-65w, T.D. 4,206 ft., top basal Sundance 4,130 ft., sat. to 4,183 ft., 7-in. 4,127 ft., swabbed 90 bbl. first 10 hr., showing increase at end of period.

Notches, Natrona County: Trigood Oil Co. 3 Government, NE NW NW 10-37n-85w, T.D. not reported, 7-in. 2,886 ft., swabbed 300 bbl. per day from Tensleep through tubing.

MONTANA COMPLETIONS

Conrad Butte, Pondera County: R. C. Tarrant 1 McCracken, C SE NW 12-29n-1w, T.D. 755 ft., est. 500,000 cu. ft. of gas, will save for drilling deep test.

Cut Bank, Glacier County: Texas Co. 12 State, C SW NE 16-32n-5w, T.D. 2,980 ft., 7-in. 2,946 ft., Cut Bank 2,935-70 ft., main pay 2,957-70 ft., 1,800 ft. fluid in hole, swabbed 280 bbl. first 24 hr.

Kevin-Sunburst, Toole County: Imperial-Craig 3 Gauss, SW SW NW 18-35n-1w, T.D. 1,643 ft., P.B. to 1,638 ft., shot with 80 qt., acid. 1,000 gal., averaged 25 bbl. per day on 10-day test.

Black Label Oil Co. 13 State, NW NE NE 16-35n-2w, T.D. 1,716 ft., P.B. to 1,660 ft., acid. 1,000 gal., averaged 72 bbl. daily on 10-day test from break in lime at 1,644-50 ft.

NORTHWEST NEW MEXICO COMPLETIONS

Barker dome, San Juan County: Southern Union Prod. Co. 3 Ute Indian, C SW SW 21-32n-14w, T.D. 2,340 ft., Dakota sand at 2,280-40 ft., completed as gas well, quantity not stated.

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OHIO, INDIANA, KENTUCKY

New Clinton Sand Gas Field Opened in Coshocton County

ZANESVILLE, Ohio.—The Ohio Oil Co. opened up a new gas pool near Layland, Clark Township, Coshocton County, 1 mile west of the oil pool operated by the Pure Oil Co. The discovery was drilled on the Charles Guthrie tract in Lot 21, and made 829,000 cu. ft. from the Clinton sand at 3,238-62 ft. Three inside wells were completed in the Clayton oil pool in Perry County, while several more were testing. Scattered gas wells made up the balance of the week's completions.

OHIO COMPLETIONS

Athens County, Rome Township: Bode et al 1 Press Frost, Sec. 32, Keener dry, T.D. 1,035 ft.
Coshocton County, Clark Township: Ohio Oil Co. 1 Chas. Guthrie, Lot 21, Clinton, 829,000 cu. ft., T.D. 3,387 ft.
Holmes County, Knox Township: Ohio Fuel 1 G. H. Young, Sec. 20. Clinton, dry, T.D. 2,821 ft.
Washington Township: Ohio Fuel 1 Ralph Baldner, Sec. 29, Clinton, dry, T.D. 2,854 ft.
Johnston et al 1 Collier-Ferris, Sec. 34, Clinton, 279,000 cu. ft., T.D. 3,078 ft.
Knox County, Butler Township: Upham Gas Co. 3 H. A. Lower, Lot 3, Clinton, 150,000 cu. ft., T.D. 2,764 ft.
Licking County, Hopewell Township: Hazlett & Davis 3 John Fisher, Sec. 13, Clinton, 80 bbl., T.D. 3,247 ft.
Medina County, Hinckley Township: Ohio Fuel 1 Geo. F. McKee, Lot 34, Clinton, 1,970,000 cu. ft., T.D. 3,293 ft.
Lafayette Township: Ohio Fuel 1 Frank Bennszek, Lot 16, Clinton, 914,000 cu. ft., T.D. 3,139 ft.
Morgan County, Marion Township: Bern O. & G. Co. 7 W. A. Huffman, Sec. 29, Berea, 50,000 cu. ft., T.D. 1,600 ft.
Muskingum County, Newton Township: Atha Co. 3 Ralph Thompson, Sec. 12, Clinton, dry, T.D. 3,345 ft.
Noble County, Seneca Township: Preston Oil Co. 1 S. O. Jamison, Sec. 27, Maxon, 6 bbl., T.D. 1,200 ft.
Perry County, Clayton Township: Pure Oil Co. 2 J. W. and Bertie Ford, Sec. 6, Clinton, 68 bbl., T.D. 3,284 ft.
Pure Oil Co. 5 Jesse A. Cannon, Sec. 7, Clinton, 125 bbl., T.D. 3,195 ft.
Reading Township: Ind. Gas Co. 4 Albert Wilson, Sec. 12, Clinton, 15 bbl., T.D. 3,246 ft.
Ind Gas Co. 1 Fleer & Dittoe, Sec. 22, Clinton, 350,000 cu. ft., T.D. 3,027 ft.
Thorn Township: Preston Oil Co. 1 Herbert Winegardner, Sec. 27, Clinton, dry, T.D. 2,813 ft.
Ohio Oil Co. 1 F. R. Foucht, Sec. 13, Newburg, 700,000 cu. ft., T.D. 2,354 ft.
Tuscarawas County, Sandy Township: Nat. Gas of W. Va. 2 C. E. Camp, Lot 5, Clinton, 425,000 cu. ft., T.D. 4,662 ft.
Washington County, Liberty Township: Ullman Oil & Gas Co. 2 John Hendershot, Sec. 28, Germantown, 34,000 cu. ft., T.D. 945 ft.
Ludlow Township: O. J. Cline et al 5 O. J. Cline, Sec. 32, Berea, 30,000 cu. ft., T.D. 1,922 ft.
Newport Township: Dr. Huth et al 7 Ella West, Sec. 29, Cow Run, 1 bbl., T.D. 510 ft.
Wayne County, Plain Township: Ohio Fuel 1 Ethel Austin, Sec. 24, Clinton, 648,000 cu. ft., T.D. 2,921 ft.

INDIANA

EVANSVILLE, Ind.—In Gibson County, McGinnis and Bitler are making a production test on the 1 Carithers, NW NE SW 26-1s-10w, 4 miles northeast of Princeton. The last gage on the well showed 80 bbl. of oil in 12 hours natural.

Kirk D. Holland has completed the 1 Collins-Sissons, NE Don. 97-1n-10w; in the McClosky lime at 1,798-1,808 ft. for an initial production of 95 bbl. of oil a day on pump after acid.

Superior Oil Co. is drilling below 550 ft. on the 1 A. Carr et al, NW NE SW 29-4s-13w, about 1½ miles northeast of New Harmony in Posey County, and about 2 miles from other oil production. Also in Posey County, Roy Lee, trustee, is drilling the 1 Dearing, NE NE NE 30-8s-14w, at about 2,265 ft. It is a wildcat located 2 miles southwest of other oil production.

INDIANA COMPLETIONS

Daviess County: R. D. Brown 2 Cracken, N½ NW NE 21-2n-6w, pumped 3 bbl., T.D. 798 ft.
Gibson County: R. D. Brown 4 Lehman, NW SE NW 36-1s-10w, 2,500,000 cu. ft. gas, sand 1,358-64 ft., T.D. 1,419 ft.
R. D. Brown 3 Lehman, SE SE NW 36-1s-10w, 1,500,000 cu. ft. gas, Hardinsburg sand 1,307 ft., T.D. 1,385 ft.
K. D. Holland 1 Collins-Sissons, Don. 97-1n-10w, pumped 95 bbl., McClosky 1,798-1,808 ft., T.D. 1,814 ft.
Jay County: Grisswell & Kwiss 1 Hiatt, NW NW SE 16-23n-13e, dry at 1,300 ft., Trenton 1,298 ft.
Knox County: Midwest 1 Holtman, NE SW NW 114-2n-10w, dry at 1,900 ft., Ste. Genevieve 1,790 ft., McClosky 1,842 ft.
Posey County: W. A. Martin 1 Stallings, NW NW SE 25-5s-14w, dry at 2,609 ft.
Carter and Gulf 2 Irwin, SW NW NE 1-7s-14w, pumped 100 bbl. from Waltersburg and Mansfield, 20-qt. shot 1,260-65 ft., T.D. 2,007 ft.
Spencer County: Damron & Geary 1 Hall, NW NW SW 34-7s-7w, dry at 1,705 ft., Ste. Genevieve 1,569 ft.

EASTERN KENTUCKY

ASHLAND, Ky.—Three gas wells were reported completed in eastern Kentucky this week by the Kentucky-West Virginia Gas Co. and unofficial reports indicate a steady trend of operations despite the Thanksgiving holidays.

A number of new locations were made and a study of field reports indicates that several wells are near the completion stage.

EASTERN KENTUCKY COMPLETIONS

Floyd County: No. 5418 George W. Osborne land on Frazier Creek, 103,000 cu. ft. gas after show, T.D. 3,366 ft. in shale.
No. 5427 William D. Martin land on Johns Creek, 112,000 cu. ft. gas after shot, T.D. 2,477 ft. in shale.
Pike County: No. 706 Grady Blevins tract on Johns Creek, 700,000 cu. ft. gas, T.D. 1,429 ft. in Big lime.

LOUISIANA GULF COAST

Acadia Parish Wildcat Has Large Flow of Distillate and Gas

By T. F. SMILEY

NEW ORLEANS, La.—Union Sulphur 1 J. P. Gueno, which may open an important gas and distillate field in Acadia Parish, was put on a 24-hour gage last week, and it flowed 1,482 bbl. of distillate and 89 bbl. of mud, with 72,810,000 cu. ft. of gas. Pressure on the drill pipe was 400 lb., on the 7-in. casing 320 lb., and on the 10¾-in. casing 300 lb. The well was still flowing as the week closed, and no further attempt had been made to kill. The same company's 2 Gueno, being drilled as a relief well to the No. 1, was down to 1,496 ft. It set 10¾-in. casing at 1,492 ft. and was waiting on cement.

After going to 8,178 ft. Magnolia 1 Farquhar Unit O-P, in the Lockport area of Calcasieu Parish, plugged back to 6,429 ft. and was waiting on casing. A test showed top of the salt at 8,160 ft., the first salt encountered in that locality.

An electric survey from 9,124 ft. of C. & I. Producing Co. 1 Sam Haas estate, 2-4s-1w, in Evangeline Parish, showed oil sands at 8,905-16 ft., 8,985-90 ft., and 9,017-27 ft. The 5½-in. casing was set at 9,068 ft., and the well now is waiting on cement. This test originally was completed last February as a dry hole at 8,497 ft. The new total depth is 9,152 ft.

Gulf 2 Delta Securities, second test in the Bayou Couba area of St. Charles Parish, flowed at the rate of 238 bbl. of oil daily in a drill-stem test with perforations at 6,218-34 ft., with packer at 6,200 ft. After 2-in. tubing had been set the well was washed. It started to flow and began showing drilling mud up to 32 per cent. The well was killed and perforations were squeezed. Casing was reperforated at 6,187-93 ft., and as the week closed these perforations were being squeezed. The hole was drilled to total depth of 6,449 ft. and plugged back to 6,248 ft.

LOUISIANA GULF COAST COMPLETIONS

Wildcats

Orleans Parish: W. T. Burton 8 State, Lake 10s-13e, dry at 9,891 ft.

Fields

Bayou Blue, Iberville Parish: Navarro Oil Co. 1-B Wilbert Mineral Corp., 75-9s-10e, dry at 6,323 ft.
Bayou Choctaw, West Baton Rouge Parish: Carter Oil Co. 4 Morley Cypress Corp., 28-8s-11e, dry at 7,523 ft.
East Hackberry, Cameron Parish: Texas 34-B State, East Hackberry, Lake 12s-8w, location abandoned.
Paradis, St. Charles Parish: Humble 7 Manufacturers Record Publishing Co., 40-14s-20e, 519 bbl. through ⅛-in. choke, TP. 1,600 lb., C.P. sealed, gas-oil ratio 858, T.D. 10,360 ft.
Texas 7 Sunset Realty & Planting Co., 38-14s-20e, 189 bbl. through ⅛-in. choke, T.P. 1,600 lb., C.P. sealed, gas-oil ratio 608, T.D. 10,400 ft.
Pine Prairie, Evangeline Parish: Gulf 2-A Schleicher-Thomas, 36-3s-1w, 265 bbl. through 5/32-in. choke, T.P. 1,175 lb., C.P. sealed, gas-oil ratio 844, T.D. 7,730 ft.

CANADIAN FIELDS

Steveville-Princess Field Test Capped as Gasser

By VICTOR LAURISTON

CHATHAM, Ont.—No wells were completed in the Turner Valley field, but there was normal activity in other Alberta districts. In the Steveville-Princess field, eastern Alberta, Standard of British Columbia-C.P.R. 7, LSD 15, 12-20-12w4, finished at 3,385 ft., has been capped as a gasser after failing to show crude in commercial quantities.

In the Taber field, Hi-Test Petroleum 2, LSD 5, 22-9-16w4, finished at 3,180 ft. The test showed 12 ft. of oil saturation, but there was such a large water intrusion it was decided to plug the hole. The outfit is being moved for Hi-Test 3, LSD 4, 15-9-16w4, about ¾ mile north. Standard-Province No. 1, discovery well, has stepped up its pumping production to around 300 bbl. daily, crude being shipped to the Huff refinery at Lethbridge.

Vermilion Field

Announcement has been made from the headquarters of the Canadian National Railways at Montreal that the C.N.R. will sponsor drilling operations in the Vermilion field with a view to ensuring a fuel-oil supply adequate for its purposes. This step has been taken on the direct suggestion of the federal oil controller and upon the advice of government geologists, and it is planned to conduct operations with a minimum of outlay. The development has been brought about by wartime conditions and the possibility of enemy action interfering with normal fuel-oil deliveries by water from United States fields to Vancouver. It is understood that the company has secured 600 acres in the Vermilion field and contemplates a drilling program of 50 wells, which would normally involve an outlay of approximately $500,000. The project will involve either the reopening of the Vermilion Consolidated conditioning plant at Borrodaile or the erection of another plant to process the crude for fuel-oil purposes. The conditioning plant shut down about a month ago, operators claiming that after paying 90 cents a barrel for crude, the fuel-oil price of $1.15 did not offer a sufficient margin to cover processing costs, estimated at 40 cents a barrel. The Vermilion field in September had 16 wells producing from a sand around 1,825 ft. with an aggregate output for the month of 8,472 bbl., the field having shown a fairly steady increase from 2,964 bbl. last January. Production of individual wells ranges from 5 to 58 bbl. daily.

Ram River Test

In the Ram River-Clearwater area, in the northern foothills, Ram River Oils 2, LSD 8, 1-37-11w5, bottomed at 4,340 ft., made successful shutoff of upper water seepage between 596-601 ft., after seven cementing jobs. Cement will be drilled out and test made of light crude showings encountered last June in a 75-ft. porous zone below 4,250

(Continued on Page 85)

PERMIAN BASIN, PANHANDLE

McKee Sand Well Extends Abell Ordovician Field Southward

By W. D. THORN

MIDLAND, Tex.—Short extensions to proven areas provided the chief developments in West Texas drilling activities last week, as a group of important wildcats continued making hole with no important shows of oil or gas reported from any of them.

Humble Oil 1 Parker, ¼-mile south extension to the Abell Ordovician field in northern Pecos County, flowed 90 bbl. of oil per hour for 2 hours through open tubing after peforating casing at 5,371-91 ft., opposite the McKee sand. Casing had been set at 5,409 ft., 1 ft. off bottom. Its favorable structural position and its heavy initial flow indicate that a considerable amount of productive acreage may be developed on the south side of the big Abell field.

Phillips Petroleum Co. 1 Price, wildcat about 20 miles southeast of Fort Stockton, was drilling at 7,428 ft. with no shows reported. In extreme western Pecos County, Continental Oil 1 Claybrook, wildcat just southwest of an old failure. Bob Penn 1 Bowles, topped the Delaware black lime at 5,240 ft. and halted drilling to run a string of casing at total depth 5,245 ft. It will rig up cable tools to drill ahead to the Delaware sand, which should be picked up around 5,275 ft. Magnolia 1 Robertson, 13 miles northwest of Fort Stockton, bailed salt water on last test at 6,555 ft. and prepared to rig up rotary to drill ahead to possibly 7,500 ft.

Texas Pacific Coal & Oil Co. 1 fee, about ½ mile northeast of nearest production in the Soma-Noelke area of western Crockett County, flowed 50 bbl. of oil in 12 hours while drilling at 1,550 ft. and drilled ahead seeking an increase in pay. In Crane County, Atlantic Refining 1 Barnsley indicated ¼-mile southeast spread to the Sand Hills Deep field and has cemented casing at total depth 5,670 ft., in Ellenburger dolomite.

Shell Oil 1 Leaverton, closely watched deep test 4 miles southwest of the Wasson field in Gaines County, was coring below 7,190 ft. It continues to log intermittent streaks of lime with some porosity and oil stains, with some of the porous zones also showing salt water.

WEST TEXAS COMPLETIONS

Fields

Embar-Ordovician, Andrews County: Phillips Pet. Co. 21 University-Andrews, NE NE Sec. 35, Blk. 11, University Sur., elev., 3,270 ft., top Ellenburger 8,395 ft., dry, T.D. 8,425 ft.

Embar-Tubb, Andrews County: Phillips Pet. Co. 22 University-Andrews, SW SW Sec. 20, Blk. 10, University Sur., elev. 3,246 ft., flowed 259 bbl. through ½-in. choke, gravity 42.3, top Clear Fork 5,520 ft., pay 6,240 ft., acid 1,000 gal., T.D. 6,325 ft.

Cedar Lake, Gaines County: Stanolind 7 Bremont, NE NW Sec. 3, Blk. C-30, P.S.L. Sur., elev. 3,097 ft., swabbed 386 bbl., pay 4,675 ft., shot 540 qt. nitro, T.D. 4,810 ft.

Slaughter, Hockley County: J. C. Hawkins 16-A Mallet, SW SW Lab. 22, Lge. 47, Edwards C.S.L. Sur., flowed 827 bbl., acid 11,500 gal., pay 4,960 ft., T.D. 5,010 ft.

Abell Permian, Pecos County: Magnolia 3 Ericksson-State, Lot 2, Sec. 26, Blk. 9, H.&G.N. Sur., elev. 2,379 ft., dry, T.D. 3,973 ft.

Byrd, Ward County: Stanolind-Atlantic 1 Dudley A. Wood, E½ W¼ Sec. 34, Blk. 34, H.&T.C. Sur., flowed 111 bbl. through 3/32-in. choke, pay 2,580 ft., shot 90 qt. nitro, T.D. 2,608 ft.

Keystone-Colby, Winkler County: Parker Drilling Co. 1 W. E. Baird, NW NE Sec. 12, Blk. B-3, P.S.L. Sur., elev. 2,930 ft., flowed 45 bbl. through ½-in. choke, pay 3,260 ft., shot 420 qt. nitro, T.D. 3,435 ft.

Wasson, Yoakum County: Argo Oil Co. 1 L. A. Evans, NE NE NE Sec. 36-A, Blk. AX, P.S.L. Sur., elev. 3,606 ft., flowed 227 bbl. through 7/32-in. choke, pay 4,915 ft., acid 13,000 gal., T.D. 5,030 ft.

PANHANDLE COMPLETIONS

Carson County: Skelly Oil Co. 161 Schafer ranch, Sec. 197, Blk. 3, elev. 3,162 ft., potential 168 bbl., pay 3,009 ft., 587-ft. shot of nitro, T.D. 3,122 ft.

Gray County: Phillips Pet. Co. 1 Bass (E. B. Clay), Sec. 176, Blk. B-2, elev. 3,259 ft., flowed 20,800,000 cu. ft. gas, pay 2,950 ft., T.D. 3,250 ft., P.B. 3,000 ft.

Moore County: Phillips Pet. Co. 1 C. V. O'Hearn, Sec. 277, Blk. 44, elev. 3,630 ft., flowed 19,000,000 cu. ft. gas, T.D. 3,310 ft., P.B. 3,250 ft.

Red River Gas Co. 5 J. M. Shelton A, Sec. 50, Blk. 47, elev. 3,067 ft., flowed 30,700,000 cu. ft. gas, pay 2,250 ft., T.D. 2,471 ft.

SOUTHEAST NEW MEXICO COMPLETIONS

Artesia, Eddy County: Payton Bros. 5 Magruder, 35-17s-27e, flowed 70 bbl., lime pay 482-502 ft., acidized.

Grayburg, Eddy County: Premier Pet. 2-C Arnold, 26-17s-30e, flowed 124 bbl. in 4 hr., pay 3,217 ft., shot 3,202-34 ft., T.D.

W. F. Dodson 2-G Danciger, 26-17s-30e, flowed 75 bbl., pay 3,155 ft., T.D. 3,240 ft., shot 3,170-93 ft.

Monument, Lea County: E. B. Clark 2 Cooper, 3-20s-37e, flowed 735 bbl. in 28 hr., pay 3,820 ft., acidized, T.D. 3,894 ft.

Square Lake, Eddy County: Nay Hightower 4 Grier, 31-16s-31e, flowed 500 bbl., pay 3,025 ft., T.D. 3,135 ft.

MICHIGAN OPERATIONS

Production Decline Continues As Field Activity Decreases

By OTTO C. PRESSPRICH

SAGINAW, Mich.—Michigan oil activity, so far as production is concerned, continues to ebb. Of 13 completions reported last week, only two resulted in oil production. One of the completions was a small gas well in the Redding field of Clare County. Most of the dry holes were wildcat tests scattered through a half-dozen counties as operators continued their search for new fields with which to replenish the state's dwindling production. Meanwhile, three locations were abandoned as previous exploration in their vicinities gave them slight prospects to merit drilling.

Chief item of interest was the Sun Oil Co. 1 Wildoc completion in Section 27 of Osceola Township, Osceola County. The well flowed 478 bbl. the first 20 hours. Louis Rose completed 1 Beecher in Section 17, Richmond Township, Osceola County, for 112 bbl. in 2 days, but there was salt water encroachment. The doldrums continued in the permit line, too, as the state Conservation Department reported issuing only three permits for the week, for locations in Bangor-Van Buren, Polkton-Ottawa and Assyria of Barry County. Permits for the year now number 508.

MICHIGAN COMPLETIONS

Clare County, Freeman Township: Taggart Brothers Co. 27 Delling et al, C S½ 10-18n-6w, 1,100,000 cu. ft. natural gas, T.D. 1,483 ft.

Taggart Brothers Co. 28 Bicknell et al, C NE Sec. 8, dry hole, T.D. 1,501 ft.

Gratiot County, Pine River Township: Rex Oil & Gas Co. 1 Bartley, C NE SE 30-12n-3w, location abandoned.

Chartiers Oil Co. 1 Thomas et al, NE NE NE Sec. 31, dry hole, T.D. 3,301 ft.

Mecosta County, Fork Township: Sun Oil Co. 2 Murray et al, C S½ SW NW 5-16n-7w, dry hole, T.D. 4,013 ft.

Sheridan Township: Gulf Refining Co. 1 Warner, C NW SE 21-17n-7w, wildcat, dry, T.D. 4,030 ft.

Missaukee County, Riverdale Township: Turner Petroleum Co. 1 Jager, C N½ NW NE 15-21n-7w, wildcat, dry, T.D. 3,972 ft.

Osceola County, Evart Township: Sun Oil Co. 1 Glerum et al, C S½ SE SE 24-17n-8w, wildcat, dry, T.D. 3,953 ft.

Osceola Township: Sun Oil Co. 1 H. R. Becker, C N½ SW NW 22-18n-8w, location abandoned.

Sun Oil Co. 1 A. J. Becker, C N½ NW SW Sec. 22, location abandoned.

Sun Oil Co. 1 Wilcox, C N½ SE NW Sec. 27, 478 bbl. naturally first 20 hr., T.D. 3,705 ft.

Richmond Township: Louis Rose 1 Beecher, C N½ NE SW 4-17n-10w, 112 bbl. first 2 days, T.D. 3,510 ft.

Ottawa County, Holland Township: Robert L. Sanders 1 Mulder et al, C NW SE 25-5n-15w, wildcat, dry, T.D. 1,480 ft.

Polkton Township: Southwest Development Co. 1 Long, NE NE SW 15-8n-14w, wildcat, dry, T.D. 1,927 ft.

Van Buren County, Bangor Township: Fisher-McCall Oil & Gas Co. 1 Szczepkowski, SW SE NW 10-2s-16w, wildcat, dry, T.D. 1,031 ft.

Bloomingdale Township: Stanley L. Findley 1 Holmes communitized, C SW SE 12-1s-14w, dry hole, T.D. 1,332 ft.

NORTH LOUISIANA, ARKANSAS

New Shallow Sand Production Found in Catahoula Parish

SHREVEPORT, La.—A new pool was opened in Catahoula Parish, Louisiana, last week when Eugene Jordan's wildcat, 1 Louisiana Central, 22-9n-5e, was completed for 72 bbl. of oil. About 20 bbl. of salt water accompanied the oil. Drilled to 4,554 ft., with no shows at that depth, operators plugged back to test the Sparta sand at 1,810 ft. First perforations at 1,810-17 ft. recovered salt water but a second sand at the same depth filled the hole 500 ft. with oil in 8 hours. In 7½ hours the well pumped 40 bbl. of fluid before sanding up. The location is 2 miles northeast of the town of Manifest and about 15 miles east of production in La Salle Parish.

NORTH LOUISIANA COMPLETIONS

Wildcat, Catahoula Parish: Julian E. Simon 1 Knotts, SE NW 29-11n-8e, dry, T.D. 5,312 ft., Wilcox 2,845 ft., saturated sand 3,875-95 ft., 3,975-4,015 ft.

Wildcat, West Carroll Parish: Continental Oil 1 Chicago Mill, SE SW 23-20n-9e, dry, T.D. 2,879 ft.

Wildcat, Catahoula Parish: Eugene Jordan 1 Louisiana Central, Sec. 22-9n-5e, pumped 72 bbl., Sparta sand 8,110-20 ft., T.D. 4,554 ft.

Haynesville, Claiborne Parish: Ohio Oil 2 F. M. Taylor 3-P, NE NW 13-23n-8w, flowed 112 bbl. in 4 hr., Pettit 5,244-60 ft., perf. 5,243-76 ft., T.D. 5,363 ft.

Lisbon, Claiborne Parish: Big West Drlg. 1 Stewart, CSL NE 3-21n-4w, flowed est. 35,000,000 cu. ft. gas and spray of distillate, Pettit 5,012-20 ft., perf. 5,198-5,216 ft.

Little Creek, La Salle Parish: O'Meara Bros. 6 Tremont, NE NE 23-9n-1e, flowed 110 bbl., perf. 2,442-46 ft., T.D. 2,585 ft.

O'Meara Bros. 7 Tremont, NE NW 24-9n-1e, dry, T.D. 2,531 ft.

Nebo, La Salle Parish: H. L. Hunt 2 Sandlin, SW NE 8-7n-3e, dry, T.D. 4,211 ft., Wilcox 2,465 ft.

ARKANSAS COMPLETIONS

Wildcat, Arkansas County: Southern Oil 1 Trice et al, NE SW 16-2s-3w, dry, T.D. 1,390 ft.

Wildcat, Union County: Bruce Anthony 1 Giles, NE SE 26-16s-14w, dry, T.D. 5,735 ft., Cotton Valley 3,572 ft., Smackover 5,620 ft.

New London, Union County: Marine Oil 4 Frost Lbr. Co., SW SE 12-18s-12w, flowed 8 bbl. an hr., perf. 5,814-24 ft., 5,832-38 ft., T.D. 6,106 ft.

Stephens, Columbia County: J. K. Mahoney 1 C. C. Smart, NW NE 14-15s-20w, pumped 77 bbl., Smart sand 3,458 ft., perf. 3,416-46 ft.

MISSISSIPPI COMPLETIONS

Hinds County: Plains Producing Co. 1 Gaddis, NW NE 7-7n-3w, dry, T.D. 7,510 ft.

Madison County: Love Pet. 1 Anderson, NE NW 12-8n-1w, dry, T.D. 4,424 ft., sand 4,412 ft.

Yazoo County: Carter Oil 1 Bridgeforth, SE SE SE 32-12n-3e, flowed 350 bbl. through choke, sand 4,820-17 ft., T.D. 4,900 ft.

California Fields

(Continued from Page 76)

LOS ANGELES BASIN

The Defense Plant Corp. of the Reconstruction Finance Corp. has filed a condemnation suit in the southern California Federal Court to secure title to several hundred acres in the extreme eastern end of the Playa Del Rey field of Los Angeles Basin and has deposited $740,000 with the court to cover payment for the acreage, wells and equipment located thereon. The exact price to be paid each owner will be determined at the condemnation suit.

LOS ANGELES BASIN COMPLETIONS

Coyote, East, Orange County: Union Oil Co. 24 Hole, 23-3s-10w, flowed 276 bbl., 24.1-gravity, 1 per cent cut, 48/64-in. bean, pressures 200/480 lb., T.D. 3,738 ft., perf. 3,082-3,735 ft., completed in Anaheim Union zone of Pliocene age.

Huntington Beach, Orange County: Westport Oil Co. 8 W.P., 36-5s-11w, pumped 80 bbl., 15.9-gravity, 5 per cent cut, T.D. 3,898 ft., perf. 3,835-75 ft., completed in Huntington Beach sand of Pliocene age.

Wilmington, Los Angeles County: General Petroleum Corp. 5 Terminal, 4-5s-13w, recompleted pumping 175 bbl., 14.2-gravity, 20 per cent cut, T.D. 3,600 ft., milled window in original hole at 2,630 ft., set whipstock and redrilled to Ranger zone at 3,600 ft., gravel packed perf. 2,648-3,058 ft., 3,088-3,118 ft., 3,148-3,299 ft. and 3,348-3,598 ft.

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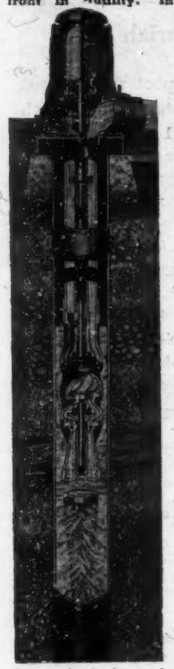

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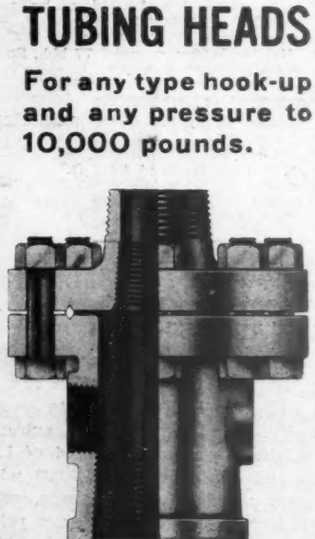

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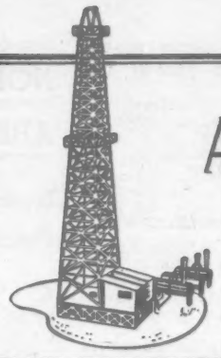

Among the Drilling

BIG CHIEF Drilling Co. has made location for a wildcat test for Blackwell Oil & Gas Co. in Payne County, Oklahoma. The well, 4 Goldsty, SW SW NE 2-17n-4e, is southeast of the March field and about 4 miles east of Cushing.

FALCON-SEABOARD Drilling Co., Houston, Tex., is starting B-1 Realty Operators for Shell Oil Co., Inc., in the Gibson field, near Houma, in Terrebonne Parish, Louisiana. It is scheduled for 9,500 ft.

FRANKLIN & TIDEMANN, Ltd., Houston, Tex., contractors, are rigging up for a wildcat test which they will drill for their own account in the Glen Flora prospect, near the town of Glen Flora, in Wharton County, Texas. The well, 1 Annie L. H. Jones, in the William Kinchloe Survey, is to go 6,000 ft.

HOUSTON Drilling Corp., Houston, Tex., finished a well in the 5,400-ft. sand last week for Gulfboard Oil Corp. on the Mauritz lease in the West Mauritz field, near Ganado, Jackson County, Texas.

GOLDRUS Drilling Co., Houston, Tex., is setting casing at 6,403 ft. for completion of Southwood Oil Co. 4 Hodnett, in the Midway field, Lafayette County, Arkansas.

McDANNALD Oil Co., Houston, Tex., is rigging up for a wildcat test in the Victor Blanco Survey, Harris County, Texas, 19 miles northeast of Houston, for its own account. The well, 3 East Texas Oil Co., is a Stanolind farmout on an 8,000-acre lease.

JORDAN Drilling Corp., Houston, Tex., was below 5,600 ft. on a wildcat test for its own account in Polk County, Texas. The test, on the Texas Long Leaf Lumber Co. lease in the I. B. Thomas Survey, is 6 miles east of Leggett.

MAC Drilling Co., Houston, Tex., is about to spud an outpost well, 1 Mueller, 3½ miles south of Nordheim, De Witt County, Texas, for Tide Water Associated Oil Co. The location is 3,000 ft. from 1 Gips.

PATRICK-TYRRELL Drilling Co., Houston, Tex., has derrick up for a wildcat 12 miles north of Tyler in Smith County, Texas, where C. L. Wickiffe, East Texas operator, has been active in assembling a block. The well will be carried to 9,200 ft. Operators plan to test the Travis Peak with an examination of the Paluxy zone on the way down. Location is in the Samuel Leeper Survey. Nearest production is in the Hawkins pool, Wood County.

MORRIS-HAMILTON Drilling Co., Houston, Tex., has finished 3 Gray, a producer for Union Oil Co. of California in the Vinton field, Calcasieu Parish, Louisiana, and this week was skidding the rig to another location in the same area.

PETROLEUM Well Service Co., Houston, Tex., has contracts for two wildcats for W. Stewart Boyle, Houston independent operator, to be drilled in Gonzales County, Texas. One is 1 Ottine Oil & Gas Co., on a 40-acre tract near the Darst Creek field. This test is rigging up. The other is on an 80-acre tract in the William Page Survey 54, near Gonzales. The hole was below 2,500 ft. late last week.

PROSPECT Drilling Co., Houston, Tex., has discontinued operation. It found itself so handicapped by the loss of men who entered war service that William S. Thomson, president and general manager, decided to close the offices for the duration. Mr. Thomson himself is now a lieutenant commander in the Naval Reserve.

SOUTHERN Drilling & Well Servicing Co., Houston, Tex., was setting surface pipe this week at Danciger Oil & Refining Co. 1 Hawes, at Boling, Wharton County, Texas. Southern Drilling last week finished Carpenter-Smith 1 Eberts, in the Sour Lake field, Hardin County, Texas.

HOUSH & THOMPSON, drilling contractors of Houston, Tex., has been awarded contract to drill a 7,500-ft. test, O. W. Killam 1 M. A. Dodd, about 10 miles northeast of Addicks, Harris County, Texas. Location has been staked 660 ft. south of the Smith Survey and 660 ft. south of the Smith Survey and 660 west of Section 14, W.C.R.C. Survey, being near the center of Section 13, W.C.R.R. Survey.

S. B. ROBERTS Drilling Co., Abilene, Tex., has staked location for a test in the Strand field, 10 miles northeast of Stamford and south of Haskell, Jones County, Texas. To be the Roberts 1 Hazel Strand, the well is 660 ft. from the north and east lines of NE SW Section 5, Block 5, H.&T.C. Survey. Discovery well in the field was drilled by Roberts and J. C. Hunter, also of Abilene, several years ago. It is to be a 3,500-ft. well unless pay is encountered at a lesser depth.

W. S. GUTHRIE, of Corsicana, Tex., has staked location in Scurry County, Texas, for 1 H. C. Wren, scheduled 4,000-ft. cable-tool wildcat in C NW NW 292-97-H.&T.C., 6 miles northeast of Snyder.

UNGREN & FRAZIER, drilling contractors, have spudded and were drilling at 100 ft. on the W. W. Wise and Merry Brothers & Perini 1 Butler, northeast outpost in the Wimberly, Jones County, Texas. Location is in Block 138, J. Winters Survey, and 1,097 ft. north of the Fain-McGaha 1 Butler.

AINSWORTH BROTHERS, Wichita, Kans., are the contractors on a rank wildcat which will be drilled in Mitchell County, Kansas. Duffield & Emery have completed a deal with Charles M. Coats to drill the wildcat on his block of acreage northeast of Beloit, on an east parallel of the Central Kansas uplift. The test, to be known as the 1 Black, is in C NW NE 1-6-7w, some 40 miles from nearest production and 7 miles northeast of Beloit. Plans call for moving in rotary equipment immediately. The wildcat is scheduled to be carried to the Arbuckle dolomite, expected at around 3,500 ft.

KIRKWOOD & MORGAN, Laredo, Tex., and John Mayo, have made location for 1 B. M. Cummins, Lot 5, Adams-Staples Farm Lots, 5½ miles southeast of Alice, Jim Wells County, Texas. This will be a wildcat test.

JACK W. FRAZIER, Houston, Tex., is preparing to drill a wildcat in Cameron Parish, Louisiana, in C NE¼ 12-12s-7w.

C. D. MILLER and Coastal Refineries have finished a fishing job around 3,000 ft. and have resumed drilling in 1 Faison, wildcat, contracted to 5,760 ft., or to the Wilcox, 5 miles suth of Muldoon, Fayette County, Texas.

E. V. HILLIARD, drilling contractor, has moved tools to Ranch Oil Co.'s test near Clare, Standish County, Michigan, after completing a contract for Mogul Oil Co. on the 1 Hanggi, C SW SE 35-19n-3e, ¼ mile

Contractors

southwest of the 1 McTaggart extension well and the same distance northeast of the test in Section 2, drilled by Roush & Major, Standish County, Michigan.

H. M. McCLURE has contract to drill Southwest Development Co. 1 S. Rankin, C N½ NW SE 19-1n-7w, Barry County, Michigan.

CLIFFORD A. PERRY has contract to drill Rex Oil & Gas Co. 1 William J. Visbeck, NE NW NE 9-8n-14w, Ottawa County, Michigan.

HISSON Drilling Co. has contract for 4,000 ft. on a test to be drilled for Herbert Gussman, in Reno County, Kansas. The test is the 1 McReevey, NE NE NE 33-23-9w, on a 600-acre block east of the Peace Creek area.

VIRGINIA Drilling Co. was below 2,600 ft. on its 1 Estey, SW NE 25-21-11w, Stafford County, Kansas.

RAY BOYD has contract and is waiting for the rig that is now drilling the Superior Oil Co. 1 Gross in Wilson County, Texas, before starting Hickok & Reynolds 1 Shiner Ranch, a wildcat in McMullen County, Texas.

HOLLOW Drilling Co. 1 Debes, C W½ SW NW 30-17s-11w, 3½ miles southwest of the Kraft-Prusa-Krier pool, Barton County, Kansas, was drilling at 1,800 ft. The company's B-1 Brown, SW SE 29-26s-12w, 2 miles northeast of the Iuka pool, Pratt County, Kansas, topped the Lansing-Kansas City lime series at 3,680 ft., topped the Arbuckle dolomite at 4,266 ft., drilled to 4,280 ft., ran drill-stem test and recovered 150 ft. of oil in 20 minutes. Casing was set and on drilling out cement plugs the well bailed 1 bailer of oil per hour from the Arbuckle dolomite. Crews were running tubing to acidize.

TRINITY Drilling Co. was starting the 2 and 2 Alex Slaughter, Labor 18, Leauge 35, Zavalla County, Texas, School Survey, in the Slaughter pool, for 5,200-ft. tests.

GINTHER, WARREN & GINTHER, Houston, Tex., have staked location and are scheduled to start drilling immediately on a 5,550-ft. well for their second test of the Carrie G. Wood et al land, 8 miles southeast of Goliad, Goliad County, Texas. The first test, 1 Carrie G. Wood, was completed for a gasser making 180,000,000 cu. ft. per day. The new test is staked 2 miles east of the Sarco Creek field.

HELMERICH & PAYNE, Inc., have made deal with Bradley Brothers of Wichita, Kans., for two wildcats. One is the 1 Kalina, SE SE SW 3-18-8w, and the other the 1 Staatz, C SW SW 11-18-9w, Rice County, Kansas.

COMANCHE Drilling Co., Blackwell, Okla., has just finished a test for Ingling & Parker Co., of Wichita, Kans. The test was the 1 Gravel farm, 14-24n-1w, in Noble County, Oklahoma. Comanche is moving rotary tools to drill a test on Williams farm, SE 29-25n-1w, Kay County, Oklahoma.

TOM ALLEN, Wichita, Kans., drilling contractor, has been awarded contract to drill a test to the Arbuckle in Phillips County, Kansas. R. E. Good and J. M. Floyd, of San Diego, Calif., have started the test, which is in NE NW¼ NE 30-3s-17w. Structure was worked out by Harry A. Aurand, of Denver, Colo.

HARRY SHUMAN will drill a rotary test to 6,300 ft. on a location that has already been staked by A. F. Caryer, of Washington, D. C., and Travis F. Morrow, of Dallas, Tex., 1 mile north of Fruitvale in Van Zandt County, Texas. The well has been designated A. F. Carter et al 1 J. H. Hazel, and is 660 ft. from the east and 660 ft. from the south line of a 40-acre tract in the H. C. Morris Survey. The test will go to the Paluxy sand. The prospectors figure this location, almost midway between the Van Woodbine pool and the Amerada Paluxy pool in Wood County, will give them a chance in either sand.

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Holmes Tells Lea Committee Of Contractors' Labor Problems

HOWARD P. HOLMES, president of Two States Drilling Co., and vice president of South States Drilling Co., Dallas, Tex., in a statement before the subcommittee of the House interstate and foreign commerce committee at Washington, D. C., last week, spoke eloquently of the labor problem which confronts the drilling industry. He said in part:

The necessary experience time for all our men is comparatively long. The contractor must provide men who have worked at this particular business for a long enough time that they have developed the knowledge and judgment which permit them to do this very exacting piece of work, drilling hole, at points under the ground from 0 ft. to extreme depth, yet without being able to look at the hole they have made.

Our top management men are irreplaceable, being qualified by years of experience, plus particular qualifications of judgment. I would question seriously the experience of a man for a field superintendent, or tool pusher, who has spent less than 10 years in the oil fields. A driller, the skilled man, actually running the machinery by the same standard should have at least 5 years. Our laborers, whom we call roughnecks, can be more rapidly trained if we have the men. It should be stressed, however, that our work is fast by tempo, demanding of physical vigor and strength, and dangerous. The danger is proven by our rates of accident compensation insurance charges, based upon experience, in spite of the very active program of accident prevention in the industry.

In the past year we have willingly released our expert men from our labor pool to the armed services and to the defense industries. They have gone to these services to such an extent that today we have great difficulty in operating even at our present reduced rates. A considerable time for training would be needed if even a very small percentage of increase in the drilling pace should be required.

What I am driving at is this: If the present rate of drilling operations is to be maintained, we must lose no more men, particularly those out of our more highly skilled brackets. If we are to be asked to step up the rate of our operations, even by a very small percentage, we cannot do it immediately, and when we can, it must be done by raiding other labor pools for untrained men, which we in turn must train for our less responsible types of work.

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Personal Paragraphs

ERNEST COCKRELL, independent oil operator of Houston, Tex., has the distinction of making the largest contribution ever received from an individual by the Goodfellows Club, which annually provides Christmas gifts for poor children of Houston. His check for $300 was handed to CHARLES R. FOX, another independent oil man, who is known as No. 1 Goodfellow and who interests his friends in the oil business in the Christmas project.

GEORGE W. EADS, superintendent of materials, Sun Oil Co., will leave Tulsa for the Volunteer Officer Corps, at Fort Sill, Oklahoma, having volunteered for Army service.

DONALD M. PHILLIPS, associated with Phillips & Milam, in the oil business, was in charge of the program of the Claremore, Okla., Rotary Club last week.

J. W. SELBY, Shell Oil Co., Inc., Houston, Tex., presided at a meeting last Saturday of the National Oil Scouts and Landmens' Association at Dallas, Tex., at which executives and directors decided to hold a 1-day business session next February 4 in lieu of its annual 3-day convention.

G. MILLS, safety director of Shamrock Oil & Gas Co., Amarillo, Tex., is proud of a handsome glass and walnut plaque received from the National Safety Council for his company's record for safe driving. The Shamrock record was made by the drivers of 10 trucks and cars who turned in a record of 325,000 miles without accident.

DR. CHARLES D. LOWRY, JR., Universal Oil Products Co., discussed "New Developments in Petroleum Technology of Interest to Metallurgists and Metallurgical Engineers," recently before a joint meeting of the American Society of Metals and the American Society of Mining and Metallurgical Engineers, at Canton, Ohio.

WILSON K. PAGE, Olean Petroleum Co., Olean, N. Y., has been named chairman of a newly created technical steering committee of the Bradford district research group of the Pennsylvania Oil Producers Association. Other members of the committee are HARRY M. RYDER, of Ryder-Scott Co., and D. T. ANDRUS, oil producer.

E. A. WAHLSTROM, head of the Goldsmith Pool Engineering Committee, explained the plan of transfer of high gas-oil ratios to low gas-oil ratios on the same lease as applied in the Goldsmith pool of Ector County, Texas, to members of the Lea County, New Mexico, Operators Association, last week. H. J. KEMLER, general manager of Shell Oil Co., Inc., Midland, Tex., presided at the meeting.

H. M. KISTEN, attorney in the Texas Gulf area for Shell Oil Co., Inc., has been appointed acting assistant manager of the legal department there, succeeding R. H. WILDEN, now acting manager. J. T. LAMB has been appointed acting manager of the eastern area legal department, succeeding J. C. QUILTY, who has been transferred to the head office.

J. W. LIDDELL

J. W. LIDDELL, manager of railway sales for Continental Oil Co., Chicago, has moved to Washington, D. C., where he has been assigned to special duty on the staff of MAJ. J. R. PARTEN, director of the Transportation Division in OPC. While on leave of absence for the duration, Mr. Liddell's railway sales activities will be handled by E. F. SHANNON, assistant manager of the division. Mr. Liddell has been associated with Continental for more than 18 years. He was appointed manager of the railway sales division in January 1941.

ED REILY, formerly in the transportation division of Continental Oil Co., Ponca City, Okla., has been installed as deputy grand master of the Independent Order of Odd Fellows.

ROBERT B. CAMPBELL, consulting geologist of Tampa, Fla., has been elected president of the Florida Academy of Sciences to serve during the coming year. The annual meeting was held at University of Florida.

WILLIAM C. TAYLOR, formerly employed by Kerr-Lynn Drilling Co., Oklahoma City, Okla., is now a private in the Army and is stationed at the Oklahoma City, Okla., Air Depot. He was transferred there from Fort Riley, Kansas.

DR. H. S. KNIGHT, head of the department of geology, University of Wyoming, will address the December meeting of the Panhandle Geological Society. Dr. Knight's talk will be on "Physical Evolution of the Rocky Mountains."

CAPT. CLARENCE A. MANN, who owned the Ray Oil Co. until he entered war service, is now base supply and material officer, project and building officer, and commander of the 749th Squadron at the Army flying school at Pecos, Tex. In addition he has supervised construction of club and recreational buildings at the Pecos school.

DR. CAREY CRONEIS, professor of geology at University of Chicago, addressed members of the Fort Worth (Tex.) Geological Society Monday evening. His subject was "Geological Warfare." C. G. CORDRY, geologist with Gulf Oil Corp., reviewed a recent publication of the A.A.P.G. research committee, on sedimentation.

Do You Remember?

From The Oil and Gas Journal Files

35 YEARS AGO (1907)

Gulf Pipe Line Co. posted a notice at Tulsa making the price of oil 35 cents. Texas Co. has sent out circulars to Glenn field producers asking for proposals for the sale of oil in amounts of 10,000 bbl. or more for delivery by April.

November tops all previous months this year in point of new production in Gulf Coast fields, being credited with 17,980 bbl. from 63 wells, an average of 285 bbl. to the well.

Royal Petroleum Co., Jennings, La., received the highest award at the Jamestown Exposition on its display of alboleum, engine oil, and other products of Jennings crude made at the refinery at Jennings.

25 YEARS AGO (1917)

James Collopy, son and namesake of a prominent oil man in Tulsa, has gone to New York to enlist in the U. S. Marine Corps. The young man has been associated with his father in the oil business.

J. W. Moore, oil operator in Okmulgee, Okla., was joined in marriage recently at Muskogee, Okla., with Miss Louise Clark, also of Okmulgee. They left on a wedding trip to New York City last week.

Exemption from military service granted on industrial grounds to skilled oil-well drillers may be revoked if at any time the Government decides they are more needed in the fighting than in the working ranks.

15 YEARS AGO (1927)

The American Petroleum Institute has established three new divisions of the organization in an effort to gain greater efficiency. The new divisions are producing, refining, and marketing sections.

F. T. Manley, manager of the refining department of Texas Co., has been elected vice president of both Texas Corp. and Texas Co., and T. Rieber and W. S. S. Rodgers have been elected directors of both organizations.

W. B. Pyron, third vice president of Gulf Production Co., Houston, Tex., has been transferred to Los Angeles, Calif. effective January 1, to assume management of the company's holdings in California.

W. R. REYNERSON, production foreman in the southern California division for General Petroleum Corp., recently completed 30 years' service.

A. E. HALVERSON, vice president of Imperial Oil, Ltd., is making a tour of the company's branches in western Canada.

W. B. VORHEES, who has been employed by Mid-Continent Petroleum Corp. in the Virgil, Kans., district production department, is in service at Great Lakes Naval Station.

J. M. FOUTS, JR., formerly exploitation engineer for Shell Oil Co., Inc., in the Iowa field, Louisiana, is now an ensign in naval training at Harvard University.

ED BORREGO, field superintendent for Standard Oil Co. of Venezuela in the Quiriquire field, has arrived in this country for a vacation which will be spent in Oklahoma.

JOE KAYSER, foreman of the boiler shop at the Lima, Ohio, refinery of Standard Oil Co. of Ohio, has retired after completing 30 years of continuous service with the company.

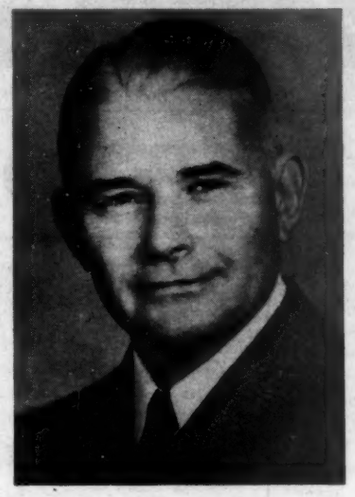
BARTON P. SIBOLE, president of Stanolind Pipe Line Co., Tulsa, is the nominating committee's choice for president of the Green T Club of the Tulsa Chamber of Commerce for 1943.

J. S. MORSE, operations manager of the Detroit, Mich., office, for Shell Oil Co., Inc., has been granted a military leave of absence to accept a commission as lieutenant, senior grade, in the Navy. As his first Naval assignment he was ordered to Massachusetts Institute of Technology for a special course of instruction.

H. GERSHINOWITZ, director of research at Houston, Tex., for Shell Oil Co., Inc., has been transferred to the head office manufacturing department, New York City, as research director. M. P. L. LOVE, until recently of the head office manufacturing department, has been appointed chief research chemist at the company's Houston refinery.

Heads Contractors

N. Hobson Wheless, newly elected president of the American Association of Oilwell Drilling Contractors, is a resident of Shreveport, La., where he was born and where he has lived the greater part of his life.



N. HOBSON WHELESS

He received his education at the University of the South, Sewanee, Tenn., being a member of the class of 1913 and there he was a member of the S.A.E. fraternity.

After leaving Sewanee he was associated with other members of his family in the lumber and millwork business until he enlisted for service in World War I, spent 10 months in France and came out a lieutenant of the 334th Infantry, 84th Division.

When discharged from the Army he took up and pursued his former occupation until March 1923 when he sold his interest in the lumber and millwork business and organized, with A. F. Lanier, the Sultana Drilling Co., Inc. Since that time he has participated in the development of oil and gas fields in Louisiana, Mississippi, Arkansas, Texas, Oklahoma, and Kansas.

After Mr. Lanier's death in 1936, Mr. Wheless and some of his associates acquired the interests of the Lanier estate and others in the drilling company; but continued to operate under the Sultana name until 1942, when it was changed to N. H. Wheless Drilling Co.

In 1915, he married Mary Lillian Hicks of Shreveport. They have two children. A son, Second Lt. Nicholas H. Wheless, Jr., meteorologist with the Air Forces, is married to Elsie Hooks; and a daughter, Marilyn, is married to Lt. John A. Hedrick, Jr., M.C., also with the Air Forces.

Mr. Wheless is justly proud of his famed nephew, Maj. Hewitt T. Wheless, of the Air Forces, whose home is in Menard, Tex., and of two other nephews of Shreveport (brothers) Capt. Wesley E. Wheless, Jr., of the Coast Artillery and Second Lt. Burrows J. Wheless of the Air Forces.

Last but not least from a point of personal pride are his connections with the Commercial National Bank in Shreveport as a director and member of the executive committee, and with St. Mark's Episcopal Church of Shreveport in which he has been honored with the office of senior warden.

ROBERT F. OILER, scout-clerk in the Shell Oil Co., Inc., office in Tulsa, has been called to training camp at Sheppard Field, near Wichita Falls, Tex.

HOMER J. STIMSON, who was exploitation engineer for Shell Oil Co., Inc., in the White Castle, La., headquarters, is now an ensign in training at Dartmouth College, Hanover, N. H.

FIRST LT. CARL E. HECK, who was field engineer for Texas Co. at Houma, La., before he entered the armed forces, has been transferred from Washington, D. C., to Houston, Tex., in the Engineering Corps.

FRANK J. KIGHTLINGER, drilling foreman of Shell Oil Co., Inc., in Los Angeles Basin production division, on his retirement last week was given a dog which he named Joe Shell in remembrance of being bitten while on the job 20 years ago.

CECIL LEE BARTON, petroleum engineer with the California Oil and Gas Division since 1928, has been commissioned a captain in the Chemical Warfare Branch of the U. S. Army and is at present at the officers' replacement pool at Edgewood Arsenal, Maryland.

J. H. GRAHAM, recently with Larkin & Graham, oil operators in Tulsa, and previously assistant superintendent of the gasoline department of Carter Oil Co., is now analyst for the natural-gas and natural-gasoline division of District 3, OPC, at Houston, Tex.

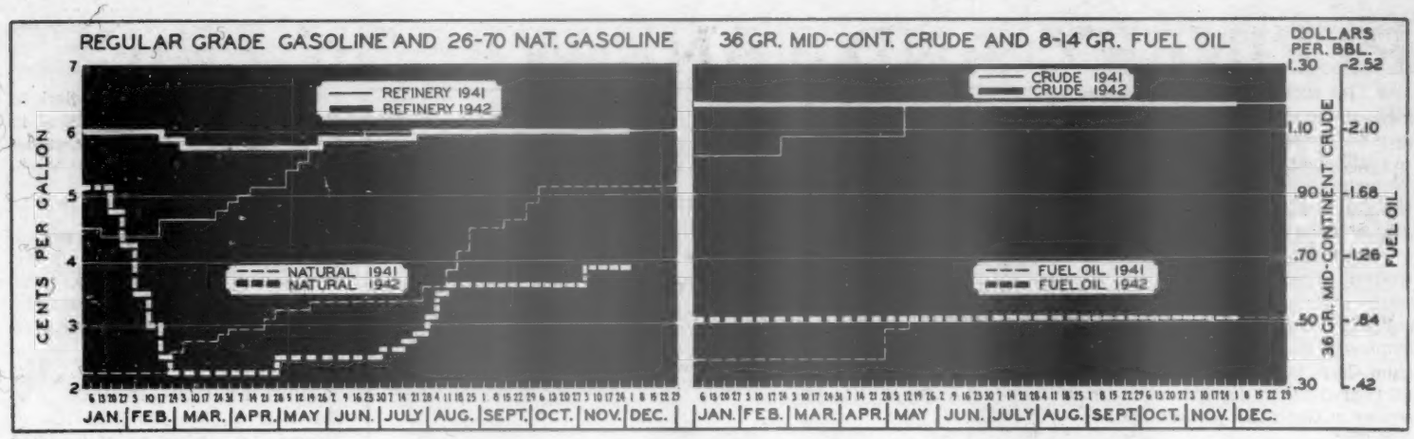
A. P. McKILLOP, purchasing agent of Tide Water Associated Oil Co., with offices in San Francisco, has been appointed a member of the materials subcommittee which is working out problems of distribution and utilization of manpower and oil equipment.

CAPT. J. B. STENE, now supervisor of Union Oil Co. of California marine operations, was an honored guest at a luncheon tendered by W. L. STEWART, JR., vice president. Captain Stene was given the ship's bell from the tanker Deroche which he commanded for a number of years and on which he advanced from ordinary seaman to quartermaster, bo's'n, third mate, second mate and finally master of the vessel.

Shifts: THOMAS W. KEATING, engineer, Stanolind Oil & Gas Co., Eunice, La., to Tulsa; F. B. LOOMIS, JR., geologist, Shell Oil Co., Inc., Jackson, Miss., to Shreveport, La.; A. W. TWEELINGS, engineer, Stanolind Oil & Gas Co., Midwest, Wyo., to Minneapolis, Minn.; R. L. AIKIN, superintendent, Foundation Oil Co., Tulsa, to Bay Petroleum Co., Midland, Tex.; CHARLES A. BREITUNG, engineer, Southwest Natural Gas Co., Ada, Okla., to Dallas, Tex.; QUENTIN F. EBERT, engineer, Gulf Oil Corp., Port Arthur, Tex., to Barberton, Ohio,

Among the guests present at the meeting last month of the Los Angeles, Calif., chapter of Nomads were B. R. CUNNINGHAM, Venezuela Oil Concessions; FRANK McATIER, formerly with Burmah Oil Co.; MEADE McCAMEY, Nederlandsche Koloniale Petroleum Maatschappij, East Indies; J. C. VANDENBERG, N. V. de Bataafsche Petroleum Maatschappij, East Indies; SANFORD HALL, Burmah Oil Co.; E. B. UDLOCK, Standard Oil Co. of Venezuela; W. F. PARRAGA, C. A. S. O. C.; JOHN BRYDE, Cia Shell de Colombia, and HOMER LeFLOR, Socony-Vacuum Oil Co., of Venezuela. The speaker of the evening was HUGH MATIER, in charge of public relations of Union Oil Co. of California. The subject of his address was "Alaska, the New Frontier."

R. W. ERWIN, Salt Water Control Corp., Kilgore, Tex., was elected president of the East Texas chapter, American Institute of Mining and Metallurgical Engineers, at last week's meeting of the group. Other officers are D. W. AKINS, JR., Ohio Oil Co., Shreveport, La., and J. S. FULLER, Oil Well Supply Co., Dallas, Tex., vice chairmen; R. M. HESS, Shell Oil Co., Inc., Kilgore, secretary-treasurer. New directors are A. S. RHEA, Sun Oil Co., Tyler, Tex.; W. E. WINN, Sun Oil Co., Dallas, and R. O. GARRETT, Arkansas Fuel Oil Co., Shreveport.



MARKET DEVELOPMENTS . . .

East Coast

NEW YORK.—The serious aspect of the District 1 oil supply situation became increasingly apparent during the past few days as the market for gasoline tightened up considerably. Previously gasoline had been reported comparatively easy because shipments from outside sources had included a disproportionately large volume of motor fuel.

The reduction in the proportion of gasoline brought into the area coupled with much lower than expected rail shipments and the supplying of overseas demands from this area have made motor fuel tighter than heating oil. Demand for the latter has been less than anticipated due to the comparatively temperate weather experienced so far on the East Coast and to the fact that consumers had large stocks on hand when the heating-oil season began. If this winter duplicates that of last year in mildness, the prospective fuel-oil shortage will be tempered greatly.

A secondary factor contributing to the situation has been the inability of oil companies to use the inland waterways system to the extent expected. This was due in a large part to the failure of barge building companies to supply facilities.

Mid-Continent

SHIPPING instructions for December already in hands of Mid-Continent refiners indicate that enforced rationing on a nation-wide scale has not yet caused a material decline in demand for major products. Decision to leave basic fuel-oil rations unchanged in the 30 restricted eastern states was doubtless a factor in further increases in the demand for all grades of burning oil.

Some refiners were surprised at the apparent vigor of the gasoline market. Most suppliers reserved judgment on the staying powers of the present motor-fuel demand under mileage rationing until consumption leveled off. There was little doubt that demand during November was influenced by the "last fling" attitude of numerous motorists and by the universal practice of loading tanks to capacity on the eve of rationing. Suppliers were hard pressed to maintain stocks of retailers during the last 2 or 3 days of unrestricted sales.

Meanwhile, refiners prepared to withstand more rigid administration of the directive prohibiting use of tank cars for movement of nonessential automotive fuel in the Middle West territory. Reports were circulated in the Mid-Continent that OPC representatives would clamp down on exemptions to the order banning tank cars for transportation of automotive fuel. The reports of tighter administration were connected to instatution of rationing which, some contended, would liberate a few additional tank cars for diversion to eastern service.

Calls on refiners were particularly insistent for kerosene and other grades of domestic and industrial fuels. Railroads are among the most active searchers for additional fuel, although new war industries throughout the Middle West are coming into production at a high rate and nearly all depend on oil for power.

Natural gasoline, customarily a sensitive barometer to the market for motor fuel, maintained its late November vigor at the start of this month. Most manufacturers reported their plant capacities would be fully engaged in filling December orders already on the books. Prices on all products remained unchanged.

SENTENCE SUMMARIES

MID-CONTINENT: Prices steady. Natural gasoline and refinery motor-fuel demand unaffected so far by rationing.

EAST COAST: Fuel supply lags in most parts of District 1. Refiners producing only civilian fuels facing shut down.

GULF COAST: Refiners storing light fuels. Rapid liquidation of stocks anticipated with completion of 24-in. line.

PACIFIC COAST: General market dull. Increase in fuel-oil requirements anticipated. Current supplies balance demand.

PENNSYLVANIA: Refiners pressed to meet calls for all products. Kerosene, bright stock, industrial fuels particularly active.

A.P.I. REFINERY REPORT

Week Ended November 21, 1942
(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks Gasoline	Residual	Gas oil
Appalachian	163	2,499	396	813
Ind., Ill., Ky.	742	13,383	2,533	6,410
Okla., Kans., Mo.	362	5,998	1,420	2,104
Censored group*	1,669	37,638	17,900	26,871
Rockies	96	1,523	597	419
California	690	17,545	54,933	12,923
Total Nov. 21, 1942	3,722	78,583	77,779	49,541
Total Nov. 14, 1942	3,788	79,418	78,631	49,861
Total Nov. 22, 1941	4,035	85,409	94,894	55,649

Note: Refinery runs and stocks for week ended November 28, 1942, appear on Trends page.

*Report combined on East Coast, Texas Gulf, Louisiana-Arkansas and Inland Texas at request of OPC.

CRUDE-OIL STOCKS

(Bureau of Mines estimate)

Week ended:	Bbl. of crude*
November 21, 1942	235,305,000
November 14, 1942	235,262,000
November 22, 1941	241,956,000

*Excludes heavy, unrefinable stocks in California.

Gulf Coast

HOUSTON, Tex.—Although serious impairment of motor transportation threatened to attend the first week of gasoline rationing in the Gulf Coast territory, there was no visible indication of sagging in any part of the refined-oil market. There was much speculation among refiners and marketers concerning the ultimate outcome of the rationing system, but nobody was reducing prices.

Sharply curtailed means of moving oil products have created a bottleneck in the Gulf Coast refinery market for weeks, so there was a disposition among sellers to accept added difficulties without nervousness.

Buyers in the North and East are clamoring for heavy fuels, but efforts of refiners and marketers to move these products continue to be only half successful. Unfilled orders are piling up. One marketer, who was to have begun shipment of a 50-car order November 1, said he was unable to make the initial shipment until November 23.

Tightness continues in the natural-gasoline market, with demand in the Corpus Christi area especially urgent. When the "big inch" pipe line begins operation a month or so hence it will absorb any natural gasoline in East Texas looking for outlet. This, it is expected, will tend still further to stiffen the market for that product in the Gulf Coast area.

Pacific Coast

LOS ANGELES, Calif.—Sale of Douglas Oil & Refining Co.'s refinery near Gardena, Calif., leaves only smaller plants available for operation by marketers who have been using Douglas facilities.

Little gasoline is moving. Additional service stations closed this week. Gasoline prices remained unchanged and in low range of prices.

Natural gasoline is unavailable for spot market trading and even a higher price would not bring out any considerable quantity. Stocks of natural gasoline went down over 300,000 bbl. during October and also decreased in November.

Fuel-oil demand continues brisk but stocks do not show much change as refiners are charging substantially larger amounts of crude to stills. By charging more crude oil to stills, stocks of fuel oil have become stabilized.

Refiners and marketers are buying all available gas oil and holding it as blending stock for residual fuel. Due to low production there is very little gas oil available for trading.

REFINERY AND TANK-WAGON PRICES

(Prices as of December 1)

Refinery Gasoline

Octane (A.S.T.M.):	†80	78	74-76	72-74	68-70	63-66	60 & lower
Mid-Continent*				5.875-6.000	.....	5.500-5.625	5.125-5.250
Pennsylvania			6.750-7.000				
Gulf Coast‡	6.00-6.50		.....	§5.750-6.250	§5.750-6.250	§5.250-5.750	§5.000-5.500
Northeast Coast	9.50			9.2	9.2		
Pacific Coast		6.500-7.000	6.250-6.500	6.125-6.250	5.750-6.000	5.125-5.250	4.750-5.000

*Basis Group 3. †1939 C.F.R. (research method). ‡Integrated companies restricted to lowest prices. §Unleaded.

Quotations are f.o.b. plant in cars and in cents per gallon except where otherwise noted. They are exclusive of the federal excise taxes of 1.5 cents a gallon on gasoline and 4.5 cents a gallon lubricating oils, and do not include marine lighterage charges.

Natural Gasoline

Grades:	26-70	18-55	75-85(350-375)
Oklahoma (Group 3)	3.875	4.650	.....
North Texas	3.500	4.200	.....
North Louisiana	3.625	4.350	.....
California	.....	.....	4.875-5.500

Kerosene and No. 1 Fuel Oil

Gravity:	46	45	42-44	41-43	38-40
Mid-Continent*	.....	.....	4.500	4.375	.....
North Louisiana	.....	.....	.....	4.500-4.750	.....
Pennsylvania	6.250-6.625	6.125-6.250	.....	.....	.....
California	.....	.....	.....	4.500-5.500	4.250
Northeast Coast	.....	.....	.....	6.80	.....
Gulf Coast	.....	.....	.....	3.875	.....

*Basis Oklahoma Group 3.

Tractor, Diesel, and Bunker Fuel Oil

Specifications:	46-48° G.	24 D.I.	48-52 D.I.	58 & above	Diesel bunkers	Bunker C
Mid-Continent*	4.125	.....	.....	.....	.....	.....
California	.....	2.750-4.000	.....	.....	‡$1.35-1.45	$0.85-0.90
Gulf Coast	.....	.....	4.000	4.125	1.45	0.85
Northeast Coast	.....	.....	.....	6.800	2.780	1.65
North Louisiana	.....	.....	.....	.....	.....	†0.80-0.85

*Basis Oklahoma Group 3. †10-14° gravity. ‡Pacific Specification 200.

Furnace Oil, Gas Oil, Fuel Oil

	No. 2	No. 3	No. 5	No. 6
Mid-Continent*	3.625-3.750	3.500-3.625	$0.85	$0.80
Pennsylvania (West)	5.875-6.125	5.875-6.000	†5.250-5.500	.....
Northeast Coast	6.7	6.7	1.95	1.65
Pacific Coast	5.5	5.5	‡0.80-95	§0.80
Gulf Coast	3.875-40	.....	1.65	0.85

*Basis Oklahoma Group 3. †36-40 gravity fuel oil. ‡Pacific Specification 300. §Pacific Specification 400.

Lubricating Oils

Bright and Steam Refined

OKLAHOMA (Group 3)—		
200-210 D, 10-25		27.00
150-160 D, 0-10		23.00
120-125 D, 0-10		22.00
Steam refined:		
600 dark green (untreated)	9.00	9.50
PENNSYLVANIA—		
Bright Stocks (Pennsylvania Grade No. 8 color, 140-150 at 210, 545-550 flash):		
10 pour point		30.50
15 pour point		29.50
25 pour point	25.00	28.00
Steam refined:		
600	15.00	16.00
650	15.50	16.50
600 flash	16.00	17.50
630 flash	17.00	17.50

Neutral Oil

(Vis. at 100° F. except Pennsylvania and color N.G.A.)

OKLAHOMA (Group 3)—	
0-10 pour point:	
200-3	15.00
300-3	18.00
500-3	19.50
600-3	20.00

Note: Viscous neutrals, 10-25 pour, quoted 0.5 cent under 0-10 oils.

Wax

(Cents per pound)

OKLAHOMA (Group 3)—	
124-126 (A.m.p.) w.c. scale	4.250
PENNSYLVANIA (inland refineries)—	
122-124 (A.m.p.) w.c. scale	4.250
124-126 (A.m.p.) w.c. scale	4.250

Neutral Oil

CALIFORNIA—		
Pale oils:		
200-2½-3	7.00	7.75
400-3-4	7.25	8.00
600-3-4	8.75	11.00
Red oils:		
200-4-5	7.00	7.75
400-5-6	9.00	11.00
500-900, 5-6½	9.25	11.25
GULF COAST—		
Pale oils:		
200-3	8.50	8.75
300-3	9.00	9.25
500-3½	9.75	10.00
750-3½	10.00	10.25
2,000-4	10.50	10.75
3,000-4	12.25	12.50
PENNSYLVANIA—		
150 vis. at 70° F., 3 color, 400-405 flash:		
Zero pour point		27.50
10 pour point		36.50
15 pour point		35.50
25 pour point		30.00
200 vis. at 70° F., 3 color:		
Zero pour point		39.50
10 pour point		38.50
15 pour point		37.50
25 pour point		32.00
NEW YORK—		
Wax in bags fully refined:		
130-132 (A.m.p.) wax		5.850
133-135 (A.m.p.) wax		6.150
Crude scale:		
124-126 (A.m.p.) w.s.		4.250
124-126 (A.m.p.) y.s.		4.250

EXPORT PRICES

Gasoline—60-62° Gravity, Maximum 400 End Point

Octane:	72-74	68-70	65-66	60
Gulf Coast	6.050	6.250-6.500	5.875	5.625
Pacific Coast	.....	6.125-6.500	5.875-6.000	5.500-5.625

Distillate and Fuel Oil

	Kerosene	Diesel fuel				Bunker
	41-43	24 G.	48-52 D.I.	58 D.I.	Bunkers	C grade
Gulf Coast	4.000-4.250	.....	4.125-4.375	4.375	$1.65-80	$0.85-90
Pacific Coast	4.750-5.000	1.25-30	.....	.....	†1.35-45	*0.80-90

*Pacific Specification 400. †Pacific Specification 200.

Lubricating Oils

	Neutral oils		Bright and cylinder stocks		
	200-3	150-3	200-3	150-3	600&630 S.R
Mid-Continent	16.8	....	28.8	24.8	.....
Pennsylvania	43-50	41-46	36-37	36-37	26.5-27

GASOLINE AND KEROSENE TANK-WAGON PRICES IN 50 CITIES

(Gasoline prices based on regular grades, tax included, undivided dealer)

ATLANTIC AND NEW ENGLAND

(Socony-Vacuum Oil Co., Inc., and Atlantic Refining Co.)

	Dealer tank wagon	Combined tax	Kero. tank wag.
Baltimore, Md.	15.45	5.50	10.20
Boston, Mass.	14.90	4.50	9.50
Burlington, Vt.	16.90	5.50	....
Buffalo, N. Y.	16.20	5.50	10.30
Dover, Del.	16.70	5.50	11.20
Hartford, Conn.	15.60	4.50	....
Manchester, N. H.	17.30	5.50	10.50
Newark, N. J.	14.70	4.50	9.40
New York, N. Y.	16.10	5.50	9.50
Philadelphia, Pa.	16.20	5.50	11.65
Pittsburgh, Pa.	16.70	5.50	12.00
Portland, Me.	16.30	5.50	9.60
Providence, R. I.	15.00	4.50	9.30
Washington, D. C.	14.70	3.50	10.70
Average 14 cities	15.91	5.07	10.32

(All prices undivided dealer basis.)

CENTRAL

(Standard Oil Co. of Indiana, Standard Oil Co. of Ohio, Continental Oil Co. and Texas Co.)

	Dealer tank wagon	Combined tax	Kero. tank wag.
Chicago, Ill.	13.40	4.50	10.30
Cleveland, Ohio	15.00	5.50	*9.00
Dallas, Tex.	13.00	5.50	7.00
Des Moines, Iowa	14.40	4.50	9.80
Detroit, Mich.	14.40	4.50	9.60
Fargo, N. D.	16.90	5.50	11.30
Huron, S. D.	16.30	5.50	10.70
Indianapolis, Ind.	15.20	5.50	9.80
Little Rock, Ark.	17.50	8.00	10.00
Milwaukee, Wis.	16.10	5.50	10.50
Minneapolis, Minn.	15.40	5.50	10.30
Omaha, Neb.	15.40	6.50	9.80
Tulsa, Okla.	16.50	7.00	8.50
Wichita, Kans.	12.70	4.50	8.00
Average 14 cities	15.15	5.57	9.61

*Includes 1-cent state tax.

SOUTHEASTERN

(Standard Oil Companies of New Jersey Kentucky, and Louisiana)

	Dealer tank wagon	Combined tax	Kero. tank wag.
Atlanta, Ga.	21.40	7.50	11.40
Birmingham, Ala.	18.50	8.50	9.00
Charleston, S. C.	18.45	7.50	....
Charleston, W. Va.	18.75	7.50	13.00
Charlotte, N. C.	19.60	7.50	11.60
Jacksonville, Fla.	21.40	8.50	10.40
Jackson, Miss.	17.50	7.50	8.80
Louisville, Ky.	16.50	6.50	8.80
Memphis, Tenn.	18.60	8.50	10.80
New Orleans, La.	16.75	8.50	*10.00
Norfolk, Va.	16.95	6.50	13.80
Average 11 cities	18.58	7.59	10.58

*Includes 1-cent state tax.

MIDWESTERN

(Continental Oil Co.)

	Dealer tank wagon	Combined tax	Kero tank wag.
Albuquerque, N. M.	17.50	7.50	10.00
Boise, Idaho	20.10	6.50	16.50
Casper, Wyo.	17.00	5.50	12.00
Denver, Colo.	14.50	5.50	11.00
Helena, Mont.	17.00	6.50	13.00
Phoenix, Ariz.	18.50	6.50	12.50
Reno, Nev.	17.50	5.50	13.50
Salt Lake, Utah	18.50	6.50	14.50
Average 8 cities	17.58	6.25	12.88

PACIFIC COAST

(Standard Oil Co. of California)

	Dealer tank wagon	Combined tax	Kero. tank wag.
Portland, Ore.	17.00	6.50	13.50
San Francisco, Calif.	14.50	4.50	11.50
Seattle, Wash.	17.00	6.50	13.50
Average 3 cities	16.17	5.83	12.83
Average 50 cities	16.57	5.96	10.76
Average last week	16.57	5.96	10.76

Canadian Fields

(Continued from Page 78)

ft. At that time the oil rose through a heavy column of drilling fluid, forcing several barrels of crude into the sump, and a pressure of 1,900 lb. was built up.

Priddis Well Abandoned

On the Priddis structure, east of the North Turner Valley extension, Northwest-Priddis 1, LSD 7, 25-22-4w5, has been abandoned at 7,770 ft. The test, after drilling a lengthy section of lower Benton formation, faulted back to the upper Benton and there was no chance of getting the Madison limestone within reasonable depth.

To Cap Wild Gasser

On the Duvernay structure north of Edmonton, Alberta government engineers have started work plugging the old Frontier-Brosseau 1 LSD 8, 35-55-12w4. This well, drilled about 10 years ago, discontinued drilling at 1,682 ft. after striking a gas flow measured at 6,500,000 cu. ft. daily. Later the well caught fire and, according to official report, has been burning ever since. The flow will be mudded off and the hole plugged and abandoned. The area showed promising oil and gas indications in several wells, but development was never carried to the commercial stage.

CRUDE-OIL PRICES

Representative selected crude prices from all sections of the country appear below:

East Texas	$1.25
Conroe	1.43
Tepetate, Louisiana	1.18
Illinois basin	1.37
Pecos County, Texas	.95
Bradford, Pennsylvania	3.00
Van, Van Zandt County, Texas*	1.08

*No change since 5-21-41.

Gravity Schedules

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Texas	West Texas*
18-18.9	$0.80	....	....	....
19-19.9	.84	....	$1.06	$0.70
20-20.9	.88	$0.85	1.08	.72
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.82
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.18	1.01	1.24	.88
29-29.9	1.20	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9	....	1.07	1.30	.94
32-32.9	....	1.09	1.32	.96
33-33.9	....	1.11	1.34	.98
34-34.9	....	1.13	1.36	1.00
35-35.9	....	1.15	1.38	1.02
36-36.9	....	1.17	1.40	1.04
37-37.9	....	1.19	1.42	1.06
38-38.9	....	1.21	1.44	1.08
39-39.9	....	1.23	1.46	1.10
40 and above	....	1.25	1.48	1.12

*Includes Lea County, New Mexico.

Information supplied by "Oil and Gas Journal"

The trend is away from, and not toward, the junk pile. In the past it has frequently been cheaper to discard a worn piece of equipment and replace it with new. Present day scarcity of material changes all this. Replacements are apt to be impossible, particularly if any of the scarcer alloying elements are involved.

Regardless of the type of metal used in the original equipment and regardless of its condition, it can almost always be repaired. Modern welding technique is literally performing miracles today.

For example, gate valves with glands, stems and discs almost completely eaten away can be rebuilt and hard faced so well that they may give service comparable to a new valve.

True, the cost of such a repair is high. But price is not material when the lack of one valve may shut down an entire plant. If a repair costs several times the price of a new, but unattainable, valve it would still be economical and of importance to the war effort from the standpoint of keeping the valve — and the plant — in operation.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS: MOLYBDIC OXIDE—BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

Climax Molybdenum Company
500 Fifth Avenue New York City

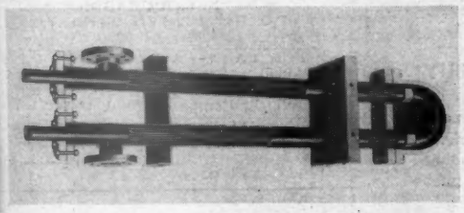
MOLY

EQUIPMENT PROGRESS...

Brown Fintube to Build Heat Exchangers

Brown Fintube Co., Elyria, Ohio, has announced that it will build and sell complete ready-to-use heat exchangers for the duration, as a service to buyers who are unable, due to the rush of war work, to get needed equipment from their usual sources of supply.

Brown Fintube heat exchangers will be built in all standard types—including the twin-section unit pic-

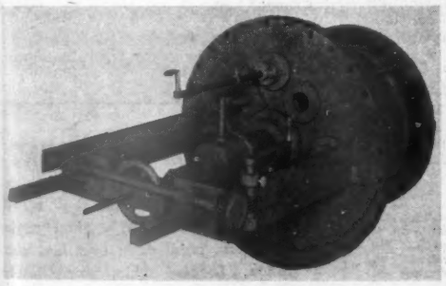


tured here—and in any capacity desired to meet practically any heating and cooling requirement. Brown Fintubes, with their exclusive welded construction that provides an integral bond of metal between the fin and the central member, said to result in high thermal efficiency, and trouble-free operation, will be employed as the heat-transfer tube in all cases.

All heat-transfer calculations will be made by engineers newly employed for this particular purpose, who have had long, specialized and successful experience in this work—and having the advantage of the Brown Fintube's thoroughly equipped heat-transfer laboratory for test runs, etc. More complete details can be secured by writing Brown Fintube Co., Heat Exchanger Division, Elyria, Ohio.

New Gas Burner

Webster Engineering Co., of Tulsa, announces the development and manufacture of a new-type gas burner particularly designed for service in air-heating



Hi-Low register-type gas burners

furnaces working under furnace pressures of 25 to 100 lb. with forced draft.

This new Hi-Low register-type gas burner has a main burner capacity of 80,000,000 B.t.u. per hour; the pilot burner has a capacity of 5,000,000 B.t.u. per hour. The unit is equipped with electric ignition and thermocouple-type safety device. The burner guns, air louvres and air vanes can all be adjusted from outside the furnace by means of a geared mechanism. The design of the burner permits its application in vertical or horizontal furnaces.

Filtrol Corp. Moves Home Office

Wright W. Gary, president of Filtrol Corp., announces the removal of the company's home office from 315 West Fifth Street, Los Angeles, to the Banks-Huntley Building, 634 South Spring Street.

Mr. Gary stated that the move was necessitated by the increased personnel now required in the home office.

"Filtrol Corp. manufacturing facilities, both at the California and Jackson, Miss., plants, are being expanded so as to enable us to fulfill the war needs for materials going into aviation 100-octane gasoline, synthetic rubber and military lubricants, commodities all vital to the armed forces," said Mr. Gary. "The catalysts developed by Filtrol and their manufacture necessitate added personnel, thereby making our previous offices inadequate."

Milburn Introduces Ply Garb, New Type Protective Clothing

A new type of protective clothing known as Ply Garb is announced by Milburn Co., Detroit, Mich., manufacturers of Ply creams and liquids for the prevention of industrial dermatitis. In both design and material, Ply Garb sleeves and aprons are an innovation that provides an exclusive combination of advantages for workers exposed to water, acid, fire, alkalis and chemicals of all kinds.

Ply Garb was designed to supplement the use of Ply creams and liquids in operations where the exposed skin is subject to abrasive action or where the protection of clothing is of prime importance. Of vital significance is the fact that Ply Garb is flameproof, preventing serious injury from spontaneous magnesium fires, and other hazardous manufacturing operations.

Made of featherweight, but extremely tough plastic laminated cotton cloth, Ply Garb sleeves and aprons offer maximum comfort and freedom of movement. The sleeves feature special air vents to guard against excessive perspiration. Adjustable shoulder straps make it easy to fit the aprons to the individual. The aprons are available in both full-front and split-front models. In the latter, the garment may be fastened around the thighs and legs in a manner similar to cowboy chaps.

Midwest Machinery Co. Represents Roto Co.

Midwest Machinery Co., 8029 Forsythe Boulevard, St. Louis, Mo., has been appointed sales representatives in the southern part of Illinois and the eastern and southern parts of Missouri by the Roto Co., Newark, N. J., manufacturers of tube cleaners. This territory was formerly covered by the late W. B. Willson.

Goodyear "War Tires" Ready

Hundreds of Goodyear Tire & Rubber Co.'s new "war tires" are flowing to distribution centers over the country in preparation for the time when they will be released to qualified civilians.

The tires are being stocked in strategic places for quick delivery to dealers as soon as the Government's new regulations are announced, it was said. Thousands more are being held in readiness at the Akron plants for whenever they are needed.

Made with regenerated rubber from the nation's scrap pile, the Goodyear "war tires" will include the same fabric which the company used in its prewar deluxe lines, according to P. W. Litchfield, chairman of Goodyear's board of directors.

In addition, he disclosed that the "war tires" will utilize the company's latest tread designs—some of them developed since Pearl Harbor—to help motorists obtain the maximum possible mileage. The new tread designs incorporate a development which compresses the tread rubber when a "war tire" is inflated, producing more mileage per tire and lessening the possibilities of punctures.

Army-Navy "E" Awarded to Union Asbestos & Rubber Co.

The Army-Navy "E" pennant for excellence in war production has been awarded to the Union Asbestos & Rubber Co., Paterson, N. J., plant. The pennant was presented in behalf of the Navy by

Lt. Comdr. Samuel J. Singer. Executive officers of the Union Asbestos & Rubber Co. who attended were L. L. Cohen, chairman and founder; James H. Watters, president; L. J. Silverman, executive vice president; Rudolph Wild, vice president; and J. H. Balch, secretary. Union Asbestos & Rubber Co. manufactures heat insulations and packing for marine, aviation, railroad and industrial use.

Rubber Spring for Autos Now in Combat Use

A rubber spring for autos is now playing an active wartime role on certain United States amphibian combat vehicles.

The spring, which operates by rubber in torsion, was cited by J. D. Beebe of the B. F. Goodrich Co., which developed it, of how rubber is being utilized as an engineering material in speeding and implementing the nation's war effort. He said the extreme simplicity of this spring's design and installation, and the absence of internal friction, had helped it prove to be a superior suspension system for the amphibian combat vehicles. It is almost a certainty that rubber springs of this type will figure in the "car of tomorrow" after the war.

He explained that the torsional rubber spring was simply a steel cylinder and shaft, with the space between cylinder wall and shaft filled with rubber. Either the shaft or cylinder is held in fixed position, and the other member connected to the wheels by arms, with all the springing accomplished simply by the twisting movement in the rubber. Test passenger autos, he said, have run more than 70,000 miles on such springs without needing adjustment.

Navy Board Renews Crane Packing "E" Award

Crane Packing Co., which was the first company in its own industry to win the "Navy E Award" last spring, has again had this honor extended by the Navy Department for excellence in production volume. The company is presenting to its staff of employes throughout the country, an original memento of the award in appreciation of the loyal and cooperative effort contributed by each man and woman to the common cause.

Changes Address

Technical Oil Tool Corp., formerly at 1311 North Havenhurst Drive, and 6416 McKinley Avenue, Los Angeles, Calif., is now located at 1157 North La Brea Avenue, Los Angeles.

CLASSIFIED ADVERTISING

THE MARKET PLACE OF THE OIL INDUSTRY . . .

Patent Attorneys

PATENTS — TRADE MARKS

All cases submitted given personal attention.

Form "Evidence of Conception" with instructions for use and "Schedule of Government and Attorney's Fees"—FREE.

LANCASTER, ALLWINE & ROMMEL
Patent Law Offices
418 Bowen Bldg., Washington, D. C.

Leases and Drilling Blocks

LEASES—East Texas, La., South Ark 20 acres up, dollar acre up.—Owners—Address Attorney, Box 1122, Little, Rock, Ark.

LEASES ROYALTIES

PRODUCING OR NONPRODUCING

Texas, New Mexico, Oklahoma.
Louisiana and Illinois
20 Years' Experience
Inquiries Invited

B. D. BUCKLEY

60 Broadview Drive, Clayton
St. Louis, Mo.

FOR SALE: Oil and Gas Leases on proven structures, drilling propositions, small production and fluorspar deposits. Reports furnished. W. P. Harley, Bowling Green, Kentucky.

CRANE COUNTY, Tex., land nearby Gulf's drilling Sec. 2, B-28. Jefferson G. Smith, 215 Littlefield Bldg., Austin, Texas.

FOR SALE: Oil and gas leases North and South Dakota, 15 cents acre. Owner, P. O. Box 1163, Tulsa, Oklahoma.

8000 ACRE STRUCTURE full geology, geophysical, cored, equipped rotary & cable. Contractor drafted. Must deal for completion. S. W. Pressey, Pueblo, Colo.

THE OIL AND GAS JOURNAL, Oct. 29, page 25, maps R. M. Area. I hold oil leases adjacent U. S. Oil Reservation lands on one great structure. Congress has opened these U. S. lands to lease by American citizens. Want several join filing U. S. lands. Small expense, great opportunity. Box B-363, The Oil and Gas Journal, Tulsa, Okla.

FOR OIL OR SALE: 480 acres, Sec. 340, Coke Co., Texas. 160 acres, Sec. 15, Tp. 16s R. 15, Plaquemines Parish, La. Owner J. Manz, Goddard, Kansas.

Royalties

ANDREW J. BARRETT
The Philtower
Tulsa, Oklahoma.

WE BUY & SELL all types of Oil and Gas Royalties. Sales restricted to registered dealers only. Grimes Royalty Co., National Mutual Bldg., Tulsa, Okla.

Financing

CAPITAL SEEKERS — Interested in raising $25,000 or more for a legitimate project should write to AMSTER LEONARD, Fox Theater Bldg., Detroit, Mich.

Oil Industry Printing

OIL FIELD LEGAL BLANKS
Leases, assignments, releases, township plat books, well records, etc. Request on your letterhead gets free catalog. Olds Press 215 East Third St., Tulsa, Okla.

Legal Blanks

THE BURKHART LINE of Legal Blanks Since 1908. Oil-Gas and Business Forms for Mid-Cont. and Illinois Basin. Leases Rev. with Gov.'s Regulations. Catalog and Samples. Burkhart Ptg. & Sta. Co., 115 So. Cincinnati, Tulsa, Okla.

Incorporation

DELAWARE CHARTERS: Complete service $35. Submitted forms. Chas. G. Guyer, Inc., Wilmington, Delaware.

Business Opportunities

WANTED: Reliable and capable oil operator to come in as a partner or to advance loan on large acreage in proven and active area of Jackson County, Texas. If interested, write to 602 Banker's Mtg. Bldg., Houston, Texas.

DRILLING Contractor contemplating a wildcat drilling campaign in shallow areas solicits associate who can afford to gamble two-fifty to five-hundred more or less. I consider it patriotic to wildcat at this time but it is highly speculative. If you are playing it safe, buy bonds. Don't waste mutual time. Box B-370, The Oil and Gas Journal, Tulsa, Okla.

ATTENTION—OIL OPERATORS
Experienced oil and gas partners wanted by Canadians for a Canadian development, 30,000 acres under lease; every evidence of structure; close to largest consuming market. Box B-380, The Oil and Gas Journal, Tulsa, Okla.

FOR SALE at cost by inventor: Two recently issued patents on oil well plugs and liner shoes. Reason for selling—"duration." Will make a good investment for oil tool mfg. company that expects to continue in business and is looking for new products, or for fortifying patent protection on related items now being made. Box B-384, The Oil and Gas Journal, Tulsa, Okla.

Money Raising

WANTED: Private capital to lay pipe line and distribution for natural gas to four small cities. Gas already proven and available. Box B-383, The Oil and Gas Journal, Tulsa, Okla.

Help Wanted

NOTICE TO ADVERTISERS

Advertisers offering positions to workers skilled in critical war industries are requested by the War Manpower Commission to include the following sentence in their advertisement:

"Applications from those now employed in war industries will not be considered."

ENGINEERS WANTED
Chemical or Mechanical with minimum one year oil refinery plant operation or maintenance experience. Require University Engineering School graduate with basic knowledge principles fluid flow. To work on process flow sheets, equipment selection and general handling oil refinery. Defense Contracts as assistant to senior engineers. No aliens or men engaged Defense work considered. Opportunity up to individual. In reply state experience, education, draft status, salary expected. Foster Wheeler Corporation, Room 2402, 165 Broadway, New York.

Situations Wanted

SEVEN years production, pipe line, lease, superintendent, and field representative, middle west fields. Twelve years highway-street construction, specializing asphalts. All positions of supervisory status. Best references. Services available December 1. Address Box B-362, The Oil and Gas Journal, Tulsa, Okla.

ENGINEER, college graduate, age 51, with 29 years ref. eng. experience, now and past 14 years superintendent, desires job in Texas plant. If interested, address Box B-372, The Oil and Gas Journal, Tulsa, Okla.

Equipment Wanted

WANTED TO BUY

Pipe of all sizes, 2" to 16", inclusive, also refineries, pipe lines and abandoned wells. Wire, write or phone

Louisiana Iron & Supply Co.
Shreveport, La.

WANTED

Abandoned *Pipe Lines*, in or out of the ground, *Oil Wells*, *Steel Buildings* and Steel Storage *Tanks* of all sizes.

JOS. GREENSPON'S SON PIPE CORP.
National Stock Yards, St. Clair Co., Illinois.

WANTED — Steel tanks total 120,000 gallon capacity. Will take 5000 gallon or larger. Tidewater Equipment & Machinery Corp., 305 Madison Ave., New York. N. Y.

WANTED

3 or 4 stage gas compressor approximately 50 cubic feet per minute capacity; motor drive. Will consider steam or gas engine. Wire or phone

W. A. Delaney, Jr., Ada, Okla.

WANTED TO BUY: One Westcott or Foxboro Gas Meter. MERRY BROS. & PERINI, Box 840, Abilene, Texas.

For Sale—Equipment

TANKS FOR SALE
220,000 gal. 43' x 20' Steel Tank. 1—14,000 gal. and 2—11,000 gal. and 1—8,000 gal. Steel Tanks. 12—9' x 8' Wood Tanks 2—10,500 bbl. 50' x 30' steel tanks with steel roofs.

L. M. STANHOPE
Wayne. Penna.

2—120 HP, 650 RPM, rebuilt Diesel engines, power units.
1—200 HP, 514 RPM, completely rebuilt Diesel engine, power unit.
The two above can be supplied with Generators if desired.
2—66 HP Boilers.
1—75 HP variable speed A.C. motor.
Also variable sizes small alternating current motors.

K. S. RICHARDS
P.O. Box 443, Fort Worth, Texas
Phone 3-5600

FOR SALE — A large stock of reconditioned valves and fittings suitable for refinery and pipe line service. Inquire Eason Oil Company, Enid, Okla.

FOR SALE at Oklahoma City: Ten 70-HP, 175# WP, F & T, LFB used reconditioned boilers. Cities Service Oil, Patridge. Bartlesville, Okla.

⅞" Oklahoma City used sucker rods 50,000 feet, good condition. 50—10 and 12" x 23' Channels. 3—24" x 20' Beams and some short pieces, smaller sizes Some reinforcing sucker rods, all at Oklahoma City. M. R. Travis, 1702 S Boulder. Tulsa, Okla.

FOR SALE
1—A. O. Smith Corporation hammered forged reaction chamber 4 ft. by 40 ft. 4 in. thick.
1—Crude Oil Fractionator tower, 5 ft by 74 ft., 4000 barrels a day capacity—⅛ inch steel shell single girth riveted, welded collar manholes.
1—lot of 3 and 4 inch O.D. key headers also some 3 and 4 inch O.D. tubing.

REFINERY ENGINEERING CO.
Forest Park, Ill.

FOR SALE
1—Imperial Type 10, 10"x4½"x10" compressor with 100 H.P. G.E. motor, skid mounted.
1 each—3'x10', 5'x15', 7'x24' separators, standard pressure.
1—15 H.P. F & M Gas Engine.
1—3'x7' scrubber tank.
Miscellaneous group of valves and fittings. 3" up.
1—Model 47 F & M oil engine, skid-mounted, complete with fuel tank.
Vaughn S. Bryan Phone 4-4111
Kennedy Bldg. Tulsa, Okla.

2—10,500-BBL. TANKS

2 Riveted Warren 50' dia. x 30' high steel tanks with steel roofs, aluminum painted, in excellent condition. Located Ohio. Immediately available.

L. M. STANHOPE
WAYNE. PENNA.

FOR SALE—One complete steam rotary outfit less boilers, located near Coyle Oklahoma, priced to sell. Inquire T. T. Eason and Company, Enid, Okla.

FOR SALE: Complete Rotary Rig, Wilson Mogul powered by International PA 100. Gardner-Denver 7½x10" slush pump powered by Climax R-61 (160 HP), Ideco 94' galvanized derrick with sills & floor, dog house, Kohler 1.5 KW light plant, Ideco 17¼" oil bath rotary, 2200' 4½" drill pipe, some new joints. Write for complete inventory and price. Box B-381 The Oil and Gas Journal, Tulsa, Okla.

FOR SALE: At Oil Hill, Kansas, 500 8⅝" OD 10 V Thread Lap Weld used Casing Couplings, 8⅜" long. Cities Service Oil Co., Patridge, Bartlesville, Okla.

CLASSIFIED ADVERTISING RATES

Classified advertising rates: First insertion, 35 cents a line; each additional insertion, 25 cents a line, PAYABLE IN ADVANCE. Six words usually make a line. Count as a word each one-letter word and each group of figures. White-space computed at regular line rate. Allow two extra lines for blind ads. Ads of less than three lines not accepted. No formal acknowledgment is made, and proofs cannot be shown in advance of publication.

	1 time	2 times	3 times	4 times		1 time	2 times	3 times	4 times
3 Lines	$1.05	$1.80	$2.55	$3.30	7 Lines	$2.45	$4.20	$5.95	$7.70
4 Lines	1.40	2.40	3.40	4.40	8 Lines	2.80	4.80	6.80	8.80
5 Lines	1.75	3.00	4.25	5.50	9 Lines	3.15	5.40	7.65	9.90
6 Lines	2.10	3.60	5.10	6.60	10 Lines	3.50	6.00	8.50	11.00

CLASSIFIED DISPLAY RATES

Classified Display is set with a border and may be used in one or two column sizes

1 Inch	1 time	$5.00
1 Inch	13 times	4.50 per inch
1 Inch	26 times	4.00 per inch
1 Inch	52 times	3.50 per inch

This space may be contracted for over a period of one year from the date of the first insertion and is PAYABLE IN ADVANCE, MONTHLY.

We reserve the right to withhold all advertising of questionable character. To avoid delay be sure to send remittance with copy. We will set your ad in the smallest amount of space possible and refund all overpayments. One-time insertions will not be run until fully paid. Forms close MONDAY NOON before each issue date.

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

COMPLETE DUBBS REFINERY FOR SALE

Vis-Breaker, Topping and Asphalt Plant

4,000 barrel topping—2,000 barrel Vis-Breaker—500 barrel Asphalt—Less than 25,000 barrels of crude ever put through this plant. Complete instrument board, new, never hooked up. Electric-eye control. Pump house complete with explosion proof motor driven centrifugal pumps.

18 heat exchangers. Over 50 tanks from 250 barrels to 25,000 barrels included. Car load Ethyl plant. Latest type of equipment offered for sale by any refinery.

Location: Titan Oil Co., Stark, Mich. (Detroit suburb) For sale in its entirety, parts or will lease in its entirety. Have complete Universal Oil Company's inspection report, together with all blue prints.

Notice—Give us a list of your surplus equipment, especially valves and fittings

SONKEN-GALAMBA SUPPLY COMPANY

W. C. Berry or H. J. Galamba
Riverside at Second, Kansas City, Kansas

Robert W. Duden
Union Ave. at Twenty-First, Tulsa, Oklahoma

CASING—DERRICKS—TUBING
We have several thousand feet of used 6⅝" casing, 2" tubing and ⅝" sucker rods. Also several pipe pumping derricks for sale cheap. Condition good.
HARLAND OIL CO.
Wolco, Okla. Phone Barnsdall 14F22

FOR SALE: 1—110 h.p. twin, direct drive Miller Compressor with 6½x20 compressor cylinder complete, now operating—$975.00. Wayne O. Watts, First Nat'l. Bank Bldg., Breckenridge, Tex.

FOR SALE AT BARGAIN—1 complete rotary rig with Cardwell R.L. double drum drawworks and 7½x12 G.D. Pump, 180 HP Engines. Box 1439, Tulsa, Okla.

FOR SALE: 1—40 ft. diam. 25 ft. high storage tank and 1—31 ft. diam. and 25 ft. high, 1—25 ft. in diam., 20 ft. high. Ed Walsh, P.O. Box 143, Marion, Indiana.

FOR SALE: Large quantity Casing and Tubing Clamps. Cities Service Oil Co., Patridge, Bartlesville, Okla.

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25 K.W. and 40 K.W. Gas Engines, 220 volts, D.C. Two 100 K.W. Gas Engine-Generator Sets, 220 volts, D.C. 7x6 Ingersoll-Rand ER-1 Air Compressor. Six-inch Oster Pipe Threading Machine. Also large stock of lathes, pipe machines, milling machines, etc. Send for our list.
Terms to suit.
CINCINNATI MACHINERY & SUPPLY CO.
26 West 2nd St., Cincinnati, Ohio.

FOR SALE: 40,000 ft. reconditioned Reda Cable. Specifications #2, 3 conductor, rubber insulated, armor covered, electric transmission cable. Part excellent for use in oil wells, other good for various electric conduction. Leonard Smith, 1526 N.E. 19th St. Ph. 5-0841, Oklahoma City, Okla.

FOR SALE: 27½" Ideal Rotary Table, 5 sheave 200 ton Crown Block, 4 sheave 72" traveling block, 8" Ideal enclosed rotary hook. Melton Machinery & Supply Co., Seminole, Okla.

DIESEL—GAS—ENGINES
Large selection — All sizes and types. Generator units, marine engines, gasoline engines, auxiliaries—boilers, steam engines, and turbo-generator sets.
Complete information on request.
A. G. SCHOONMAKER COMPANY
48 Church Street, New York, N. Y.

FOR SALE: Star Mfg. Company, portable cooling tower, telescoping type, 7' wide, 13' long, 8' high. All steel. Melton Machinery & Supply Co., Seminole, Okla.

FOR SALE—Approx. 6500 ft. 6⅝" OD 25.20# drill pipe with Reed Full Hole Shrink Grip Tool Joints, A-1 condition. Inquire T. T. Eason and Company, Enid, Okla.

FOR SALE: Complete Wilson Portable Rotary Rig with telescoping mast, suitable for 2,000 ft. drilling. Melton Machinery & Supply Co., Seminole, Okla.

FOR SALE—One partial list steam rotary equipment less boilers, rotary table, traveling block, swivel, located near Coyle, Oklahoma, priced right to sell. Inquire T. T. Eason and Company, Enid, Okla.

FOR SALE—Three 15 x 10 and one 12 x 10 Pneumatic Compressors less motors or power units. In excellent condition, suitable for low pressure service. Inquire Eason Oil Company, Enid, Okla.

REFINERY EQUIPMENT FOR SALE
Two return tube stills, 2000 bbl. capacity. Three bubble towers, 2000 to 4000 capacity, cast iron trays, 45 to 65 feet high. Three flash towers. Two return tube boilers, 100 h.p., 125 working pressure. Two treating towers 4'x12'. One kerosene agitator complete, 450 bbl. capacity. Lot misc. gate and manifold valves. Ten small steam pumps. Two Brown recorders, temperature and pressure. One T.A.D. thermostat control with valves. One drum head, 150 lb. pressure, 60,000 gals. horizontal welded tank. One vertical 11'x15' steel ¼" riveted tank, 10,000 gals. Reflux condensers, tube shell and return tube water tower cooled condensers. Equipment located in Illinois.
FALLS CITY SALES COMPANY
Box 776, Louisville, Kentucky

FOR SALE: 7¼ x 14 Oil Well Power Slush Pump. Melton Machinery & Supply Co., Seminole, Okla.

FOR SALE—Two Cardwell model RL double drum well servicing units with spudder attachments complete with wire lines, light plants, cable tools and tool houses. Melton Machinery & Supply Co., Seminole, Okla.

FOR SALE: 3000 pcs. 3" and 500 pcs. 4" Line Pipe Cplgs. Also large stock large size casg. cplgs. New and perfect. JULIUS M. FOGELMAN, Reading, Penn.

FOR SALE: At Oil Hill, Kansas, one carload ⅝" Junk Sucker Rods, and at Oklahoma City one carload ¾" Junk Sucker Rods. Cities Service Oil Co., Patridge, Bartlesville, Okla.

FOR SALE: Two 250 hp. boilers, two stage air compressor 75 kw. ac. generator, ammonia condensers, receivers, pumps, hoists, motors, absorbers, generators, valves and fittings. Must dismantle immediately. Capital Ice Refrigerating Co., Indianapolis, Indiana.

FOR SALE: Kohler 1.5 KW 110V DC light plant, Climax power unit, model R61 gas, gasolene or butane, clutch, electric starting, 1100 RPM, 158 HP; 94' galvanized derrick, 333,333 lb. capacity. Box B-382, The Oil and Gas Journal, Tulsa, Okla.

FOR SALE: 1—18' band wheel power; 6 No. 3 OK jacks complete and one 1500 watt Kohler plant; also, drilling bits stems and jars, Butler County, Kansas. Box B-366, The Oil and Gas Journal, Tulsa, Okla.

If we do not maintain a classification exactly suited to the type of advertisement you wish to run we shall be glad to create a fitting one. *Classified Department.*

SPECIAL OFFER
IMMEDIATE SHIPMENT

OXYGEN-ACETYLENE WELDING HOSE SETS

Guaranteed—Heavy Duty
Standard Size—Double Braid
Samples furnished on request

Each set consists of OXYGEN hose (BLACK) and ACETYLENE hose (RED) with standard brass couplings attached to fit all makes of torches and gauges.

Length set	*Price per set*
12½ Ft. set	$ 3.10
25 Ft. set	5.80
50 Ft. set	10.80
75 Ft. set	15.80
100 Ft. set	20.80
Connector set	.30

Hose also furnished in continuous length reels of approximately 250 ft. and 500 ft. lengths.

OXYGEN HOSE	10c per ft.
ACETYLENE HOSE	10c per ft.
STANDARD COUPLINGS	15c each

Prices net—F.O.B. New York

CARLYLE RUBBER CO., Inc.
62 Park Place New York, N. Y.

FOR SALE—COMPLETE KELLOGG PLANT

4,000 barrel Kellogg 2-coil Cracking and Vis-Breaking Unit equipped with 1,000 barrel asphalt vacuum tower.
4—Turbine driven hot oil pumps.
3—Simplex steel cylinder pumps.
1—two-stage steam driven duplex charge pump.
2—brand new Kellogg heat exchangers, never been used.
Complete set of control instruments.
Original cost over $750,000.00. Will sell in its entirety, $195,000.00.
This unit has been reserved to be re-erected at another location.
Blueprints and complete data available.

ALLIED OIL TERMINAL COMPANY

Phone 5-0324 **1601 Columbia Mutual Tower Bldg.**
MEMPHIS, TENNESSEE

Kansas Fields

(Continued from Page 75)

Chase, Rice County: Bishop Oil 1 Callis, SW SE SE 22-19-9w, pumped 475 bbl., Arbuckle 3,196-3,230 ft.

Crowther, McPherson County: Winkler-Koch 1 Blessing, S½ NE NE 27-17-1w, 2,907 bbl., Mississippian chat 2,765-82 ft.

Deichman, Cowley County: Trees Oil 2 Franks, SE cor. 23-31-4e, dry, T.D. 2,943 ft., Bartlesville 2,902 ft., Mississippi lime 2,940 ft.

Dopita, Rooks County: Phillips 2 Russell, NW NW 31-8-17w, pumped 20 bbl., Arbuckle 3,382-89 ft.

Drach, Stafford County: Atlantic 1 Hitz, SW SW 7-22-12w, swabbed 40 bbl. an hr., Arbuckle 3,679-82 ft.

Eldorado, Butler County: Cities Service 123 Chesney, NW SW NE 21-25-5e, pumped 35 bbl., Marmaton 2,166-94 ft.

Gustason, Russell County: Harry Gore 1 Miller, NE SE NE 15-15-12w, pumped 289 bbl., Lansing 2,965-67 ft., 2,893-98 ft., T.D. 2,973 ft.

Kraft-Prusa, Barton County: Magnolia 5 Riemann, NE NE SW 4-17-11w, pumped 400 bbl., Arbuckle 3,301-11 ft.

Lindsborg, McPherson County: Auto Ordnance 2 Hoglund, W½ NW NW 18-17-3w, pumped 617 bbl., Viola 3,397-3,400 ft.

Peace Creek, Reno County: Republic Natural Gas 3 Werner, SW NW 15-23-10w, pumped 160 bbl. in 7 hr., Viola 3,752-78 ft.

Cities Service 2-C Krey, SW SE NE 22-23-10w, pumped 48 bbl., Viola 3,787-92 ft.

Auto Ordnance 3 Hollenback, SW SW SE 28-23-10w, dry, T.D. 3,858 ft., Viola 3,820 ft.

Raymond, Rice County: Hyde & Stormfelz 1 Koenig, S½ NW NE 15-20-10w, pumped 42 bbl., Lansing 3,170-82 ft.

Sun City, Barber County: Great Lakes Carbon 2 Shutts, NW SW NE 35-30-15w, dry, T.D. 4,651 ft.

Wilkens, Southeast, Ellsworth County: Mid-Plains 4 Alden, N½ SW SE 32-17-9w, water disposal well, T.D. 3,500 ft.

Witt, Russell County: Hartman & Blair 1 Howland, SW SW SE 34-13-14w, dry, T.D. 3,363 ft., Arbuckle 3,276 ft.

Zenith, Reno County: Auto Ordnance 2 Volker, NW SW 6-24-10w, flowed 64 bbl. in 1 hr., Viola 3,720-58 ft.

NEBRASKA

ST. JOSEPH, Mo.—Cities Service Co. has set casing for a test of the Bartlesville sand at its 1 Jim Cook in NW NW NW 32-65n-39w, Atchison County, Missouri. This has been drilled about 4 miles southeast of Tarkio as a south offset to 1 Gray, which had a showing of oil in the sand. Samples from 1 Cook were believed to be encouraging. If this test is successful Missouri will be in a position to join oil-producing states. Thus far the Forest City Basin—the Missouri part of it—has been fruitless. South of hte basin in Jackson County and in lower Platte County there have been very small wells from shallow sands for some time, but no production from a zone as deep as the Bartlesville. Nebraska has yielded nothing from this zone. Some of the gas and oil production in the McLouth pool in Jefferson and Leavenworth counties is from the Bartlesville.

NEBRASKA COMPLETIONS

Adams County: Essiner et al 1 Routh, NW NW NE 18-6n-12w, dry, T.D. 2,430 ft., Dakota 1,110 ft., Lakota 1,393 ft., Winfield 1,750 ft., Fort Riley and Florence 1,910 ft., Wreford 1,990 ft.

Nemaha County: M. J. Sullivan 1 Beason, E½ SE SW 21-6n-13e, dry, T.D. 3,026 ft., Misener 1,380 ft., Hunton 1,725 ft., Viola 2,534 ft., Simpson 2,878 ft., shot at 2,900 ft.

Journalisms:

THE Compressed Air Institute, which is composed of 23 member companies, recently held a competition in which many papers were submitted on the general subject of "Compressed Air in Industry." One of the prize winners was S. F. Shaw, who submitted a paper on "Raising Oil and Water From Oil Wells by Combination Air-Lift Methods." The institute, realizing the wide interest that this article would arouse in the oil industry, sent it to us and it is scheduled for publication in an early issue. The author is a consulting engineer of San Antonio, Tex., and a graduate of Columbia University with a degree of engineer of mines. He was employed for 8½ years by American Smelting & Refining Co., 6 years with Carter Oil Co., and 4 years with Westgate Oil Co. He is a member of American Institute of Mining and Metallurgical Engineers, Mining and Metallurgical Society of America, American Association of Petroleum Engineers, Institute of Petroleum.

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IT has often been said that a good picture is worth a thousand words. In the same way, a good nomograph is worth a dozen pages of tables. Louis T. Monson, research engineer of the Tretolite Co. of California, has prepared a chart which facilitates the determination of tank capacities. It will be presented to our readers next week in the Engineering and Operating Section.

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DRILLING has gone a long way from the days when the "cut and try" method of increasing efficiency was about the only way in which progress could be made. Today the driller has an array of gages and indicators to watch which would have filled the old timer with dismay. The recording of the data shown by the instruments is almost impossible and the next step in directing drilling operations from headquarters is to provide some means of assembling data for future study. In this way procedures can be mapped out in advance so as to reduce costs and increase the rate of penetration of all formations. One company has built a trailer laboratory which contains instruments necessary to record 13 items affecting drilling operations. A detailed description of this unit will appear in next week's issue of the Journal together with an account of some of the beneficial results that have already been obtained through its use.

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INNOVATIONS that have proved their value in butane pumping stations over the past 2 years are covered in an article also scheduled for next week's issue of the Journal.

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ONE of the nation's largest refinery and pipe-line construction organizations starting the installation of extensive petroleum facilities for the joint use of the United States and Canadian governments shows that it knows how to get things under way in a hurry. They simply wire asking how they can obtain copies of the Buyers' Guide of Refinery Equipment published by the Journal last March as a part of the annual Refinery Number. It was precisely for requests such as this that we had a supply of reprints prepared.

This guide has proved extremely valuable during a period when refiners are expanding their operations into new fields and a few additional copies are still available.

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CAPTAIN GEORGE WEBER reports that conditions in the particular sector of the South Seas in which he is stationed are somewhat different from what he was accustomed to in Shreveport. For one thing, he finds that it is possible to erect a rig, drill a 9,000-ft. hole and move off faster than the natives can erect a grass hut. He lays it to the superiority of the incantations used in the oil fields. He also tells us that he got the Journal's Pipe-Line Number 6 weeks after the date of issue and in the same mail got a letter written 2 months earlier.

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CALENDAR OF EVENTS

December

KANSAS INDEPENDENT OIL AND GAS ASSOCIATION, fifth annual meeting, Allis Hotel, Wichita, Kans., December 7

PETROLEUM INDUSTRY WAR COUNCIL, regular meeting, Washington, D. C., December 8.

OKLAHOMA MINERAL INDUSTRIES CONFERENCE, Oklahoma City, Okla., December 10.

MID-CONTINENT OIL AND GAS ASSOCIATION, annual meeting of board of directors, Tulsa Club, Tulsa, December 17.

PETROLEUM ACCOUNTANTS SOCIETY OF OKLAHOMA, Hotel Mayo, Tulsa, December 17.

INTERSTATE OIL COMPACT COMMISSION, annual organization meeting, Biltmore Hotel, Oklahoma City, Okla., December 18-19.

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February

NATIONAL OIL SCOUTS AND LANDMEN'S ASSOCIATION, business session, Dallas, Tex., February 4, 1943.

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS, New York, February 15-18, 1943.

April

AMERICAN PETROLEUM INSTITUTE, Division of Production, Eastern district, William Penn Hotel, Pittsburgh, Pa., April 8-9, 1943.

AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS, annual meeting, Fort Worth, Tex., April 7-9.

May

PETROLEUM INDUSTRY ELECTRICAL ASSOCIATION, annual meeting, Houston, Tex., May 5-6, 1943.